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D I A L
OF
THE SEASONS,
OR A
PORTRAITURE OF NATURE.

The Sun with one eye seeth all the world.

SHAKSPEARE.

BY THOMAS FISHER.

PHILADELPHIA:
PUBLISHED BY CAREY & HART.
1845.

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DIAL OF THE SEASONS.

CHAPTER I.

The Dial of the Seasons represents the angles of incidence of the meridian Sunlight—*i.e. the Sun's Declination*—as they change in conformity with the Earth's annual motion in its orbit round the Sun, causing, at our own Latitude, the Seasons of the year; and at all Latitudes, the Seasons and Climates of all parts of the Earth.

The more direct angles which are always present at the Tropical latitudes, maintain constantly very warm temperatures, averaging, at a moderate elevation above the ocean, 88 degrees of Fahrenheit at the Equator, about 76 at the Tropics, and at least 80 degrees for the whole intertropical latitudes—*mean of night and day*—for the entire year; and giving to these latitudes the appropriate name of the Torrid Zone.

The oblique angles on the latitudes towards the Polar regions of the Earth, give but a comparatively feeble influence of Sunlight, and the average annual temperatures of the Arctic and Antarctic circles, though softened for a few weeks of Summer, are undoubtedly several degrees below Zero; these are appropriately called the Frigid or Frozen Zones.

As the temperatures most frequently spoken of, are those of the hottest or coldest hours of the day, it is proper to state distinctly, that the average temperatures here stated, are those which are arrived at by adding the highest and lowest temperature of the whole twenty-four hours, and taking the mean between these, as the average of the day.

The range and extent of this contrast of temperatures of the Equatorial and the Arctic, may be illustrated by those which are experienced at the extremes of the hottest Summers and coldest Winters, at Philadelphia.

The annual average heat, for the days of the whole year at the Equator, is greater than that of the hottest day ever felt at Philadelphia—while the annual average cold of the Arctic and Antarctic circles, is colder than the coldest day ever felt at Philadelphia.

The intermediate portions of the Earth, or the Temperate latitudes—in *Nautical phrase the Variables*—are receiving the Sun's light at an angle which is intermediate, and which causes the temperate climates—varying, however, greatly by the changes of the Seasons, and by their being a sort of battle ground where the alternate winds, and *Ocean currents*, from the uninhabitable, impenetrable deserts of frost on the one side, and from the Torrid Zone on the other, conflict with, and neutralize each other. The inland latitudes within ten degrees of the Equator are, in fact, deserts of heat yet unexplored by civilized man; the intense action of the direct sunlight drying up the Earth to a desert, unless on portions favorably situated for the reception of moisture, and consequently cooled and rendered favorable to vegetation by an abundant evaporation. Ross and Parry, and the Arctic and Antarctic explorers return to tell their narratives of suffering and privation from the cold, but the explorers of Equatorial Africa and America have seldom or never returned; they have perished from the drought, the intense heat and malignant diseases of the Torrid Zone.

The colder temperatures consequent on elevation above the ocean level, which are estimated by Baron Humboldt to equal those of a degree of Latitude further from the Equator for every 328 English feet of elevation, are of course to be considered as local exceptions to the grand laws of climate.

The pictorial portions of the Diagram are designed to present characteristic species of the plants and animals, ocean beacons, headlands and scenery, in their appropriate latitudes; and also to represent the most remarkable monuments of the civilization of man, whose history and enduring memorials are wanting in the Arctic and Equatorial climates, and whose most fortunate developments are found to belong to the intermediate *isothermal* temperatures of the Temperate Zones; the central portions of which have produced the men of the highest intellectual and moral power, and, in every department, the noblest of human achievements. The homes of the more remarkable patriarchs, historians, philosophers, poets, statesmen, warriors, architects, astronomers, philanthropists, theologians, physicians, artists, and discoverers, belong neither to the Torrid nor the Arctic, but to a somewhat narrow Zone of the Temperate intermediate climates.

This Zone of the intellectual parallels undoubtedly widens with the progress of the arts and sciences of civilization, which, originating in the more fortunate localities of the Earth's surface, are diffused by the enterprises of peaceful commerce, or the force of arms; and are gradually adopted and made available by the imitative sagacity of the less intellectual inhabitants of the Northern and Southern countries. It is thus that the labors of men of genius, in extending the dominion of man over rude nature, vivify the aggregate intellect of nations, and of the species.

The same remarks ought to be true in morals. If much is required from those to whom much is given, the moral influence of the more intellectual nations ought to be, though it is not always, beneficial to the less enlightened. The most fortunate climates do not exempt men or nations from degeneracy.

“Collateral to the main design, the Diagram may be employed to exhibit the connection existing between certain

forms of disease, the climates and latitudes in which they prevail, and thermometrical ranges of temperature," as existing within certain parallels, constituting an important element in giving intensity to endemic diseases, and to those diseases which are epidemic only at certain seasons of the year in certain latitudes.

Secondary in interest only to the natural history of our own species, is the comprehensive study of the chemico-vitality of vegetation, and the physiology of animals as adapted to the various climates in which, only, they are found to exist, or *to reach their highest perfection*. In this view are comprised the sciences of comparative anatomy, and comparative physiology, in their widest application to the entire world of animated beings, as they exist grouped each in its appropriate relation to the genial sunlight in the grand Museum of Nature.

The Dial as it presents the relations of our Earth's landscapes to the Sun, at the different periods of its annual orbit, is a first lesson in Terrestrial Astronomy.

These general views will be sustained, illustrated and enforced in succeeding chapters.

CHAPTER II.

THE SUN'S DECLINATION.

The Dial of the Seasons exhibits, first, the changes of the Angle of the Sun's light at the latitude of Philadelphia, at all seasons. The Angles are those at 12 o'clock, noon, when the Sun is on the meridian. These changes of the Angles of the Sunlight are, in Nautical and Mathematical language, called the Sun's Declination.

The Sun has North Declination for the six months of the year which comprise the Summer of the Northern Hemi-

sphere—this being the Winter of the Southern Hemisphere. It has South Declination for the other six months of the year, which comprise the Winter of the Northern Hemisphere—this being the Summer of the Southern Hemisphere.

The Sun has no Declination when it is exactly vertical on the Equator. This occurs twice in the year, at the Spring and Autumnal Equinoxes. It is only at those two moments of the year when the Earth at the West point of its orbit, changes the zenith of the Sunlight from South to North Declination, on the 21st day of March, or at the east point of its orbit, from North to South Declination on the 23d day of September.

On the 21st day of March, the vernal Equinox, the Sun rises at 6 o'clock, due East, and at 12 o'clock noon, is exactly vertical on the Equator, 2777 miles south of Philadelphia, and sets at 6 o'clock due West; the Equinoctial day being exactly 12 hours.

The Sun's light is then falling on all latitudes both North and South of the Equator, at angles which, if accurately measured at any point, or at all points, determine the exact Latitude of such points, Northern or Southern. Thus at the parallel of New Orleans, it is falling at an angle of $29^{\circ}57'$ North. At the same moment on the parallel of Philadelphia, it is falling at an angle of $39^{\circ}56'57''$ North. At London it is falling at an angle of $51^{\circ}28'39''$, and at St. Petersburg, at an angle of $59^{\circ}56'31''$ North—these angles being the Index of the respective latitudes.

For a familiar illustration, the shadows of the Palm trees of the South, or the Fir trees of the North, or of any window sill in the Temperate Latitudes, if accurately measured, determine latitude; while, at the same moment, the entire navies of the world, at least those which are in similar longitude, are taking the Sun's altitude—in Nautical language, the Sun's Declination, and thus determining their latitude.

On the 22d day of March, the Sun rises about three-quarters of its own diameter, about 24 minutes of a degree Northward of due East. Its altitude, the Angle of its light at noon, is to us in the Northern Hemisphere about three-quarters of its own diameter higher; and the place of its setting about three-quarters of its own diameter North of West. It would thus apparently describe a higher arc in the heavens. If, for illustration, its apparent path of the 21st, were visibly marked on the sky, its path of the 22d would be three-quarters of its own diameter, or 24 minutes of a degree higher than its path of the 21st.

The Sun was vertical on the 21st, at the Equator. On the 22d it is vertical about twenty-four geographical miles North of the Equator. It has acquired about 24 minutes of a degree of North Declination. In the Northern Hemisphere, it has acquired about 24 minutes of a degree of additional altitude. In the Southern Hemisphere, it has lost altitude to the same extent.

On the 21st, the Sun was vertical on the Equator. It had no Declination. The Sunlight and length of day were equally divided between both Hemispheres. The day was 12 hours long. On the 22d all of the Northern Hemisphere has a longer day and higher angle of the Sun's light. All of the Southern Hemisphere has a proportionally shorter day and a lower angle of the Sun's light. It is obvious that only one half of a globe can be in Sunlight, and that as one side or Hemisphere is thrown into more direct light, the other side is correspondingly thrown into oblique light.

From the 21st of March, the vernal Equinox—when the Earth is at the extreme West point of its orbit, till the 21st of June—the Summer Solstice, when the Earth is at the extreme South point of its orbit, the Sun rises every day further and further North of East, it is every day vertical at a parallel further North, is of greater meridian altitude in the Northern Hemisphere, and sets every day further and

further north of West, increasing its North Declination and its altitude daily, and describing a higher path in the heavens.

Let us suppose, for illustration, that the paths of the Sun for every day were visible on the sky, and that the outlines of the Suns of succeeding days could be traced; the Sun of the 21st of June, would rise forty-four Suns' diameters, $23\frac{1}{2}$ degrees North of East, would be forty-four Suns' diameters higher at noon, and would set forty-four Suns' diameters North of West—giving to the Northern Hemisphere its highest angle of the Sun's light—and giving at Philadelphia a day of nearly 15 hours. The Sun has then reached its extreme of nearly $23\frac{1}{2}$ degrees of North Declination, and is vertical over the Tropic of Cancer, viz: *the Northern turning point*, about 1630 miles North of the Equator, and about 1146 miles South of Philadelphia.

The Sun's declination might be well illustrated by supposing a series of vertical towers accurately built, or of wells accurately dug, down which the Sun would shine vertically every day in the year; those commencing at the Equator on both sides would be about twenty-four miles distant from each other, while those next the Tropics would be about a quarter of a mile. The Sun's declination describes on the Earth's surface a spiral line of advancing or receding incidence of which the two Tropics are the semi-annual limits.

From the 21st of June, daily, till the 23d of September, the Earth returning on the Eastern side of its orbit—the Sun retraces every day a lower arc in the heavens, giving us every day a shorter day—and becomes vertical each day at parallels nearer and nearer to the Equator, its North Declination decreasing daily—till on the 23d of September, when the Sun again becomes vertical on the Equator, and we have the Equinoctial day and night of twelve hours; the Sun rising at six and setting at six o'clock.

At the moment of crossing the Equator, the 23d of September—the autumnal Equinox, when the Earth is at the East point of its orbit, the Sun has no Declination, *i. e.*, is again exactly vertical on the Equator. From the 23d of September, daily, till the 21st of December—the winter Solstice when the Earth is at the North point of its orbit—the Sun rises every day more and more South of due East ; it becomes vertical every day at parallels more and more South of the Equator, and thus acquires daily an increasing South Declination. It continues to describe every day a lower and lower arc in the heavens, giving in the Northern Hemisphere shorter and shorter days, until the 21st of December, when it reaches its extreme of South Declination, and the angle of the Sunlight is most oblique.

On the 21st of December, the Sun is vertical about $23\frac{1}{2}$ degrees South of the Equator at the Tropic of Capricorn, or Southern turning point, about 4400 miles South of Philadelphia ; the word Tropic being derived from the Greek verb *trepo*, to turn. Our days in the Northern Hemisphere have shortened, and those in the Southern Hemisphere have lengthened in a similar proportion ; giving us, at Philadelphia, days of about nine hours.

From the 21st of December, daily till the 21st of March, the Earth's motion brings the Southern Hemisphere every day vertical to the Sun, at parallels nearer and nearer to the Equator, till the 21st day of March, when the Sun is again vertical at the Equator, and we have one more day of twelve hours—the sun having no declination, and rising at six o'clock and setting at six o'clock, in all parts of the world.

To recapitulate,—on the 21st of March, and the 23d of September, the Spring and the Autumnal Equinoxes, the Sun is vertical on the Terrestrial Equator, divides its light equally between both Hemispheres, gives us days of twelve hours, and its apparent path on the sky, to observers in all latitudes, is the Celestial Equator. On the 21st of June—the Summer

Solstice—it is vertical on the Northern Tropic. Its path on the sky, to observers in the North Temperate Zone, is $23\frac{1}{2}$ degrees, forty-four Suns' diameters higher than the Celestial Equator. We have, at Philadelphia, days of about fifteen hours. On the 21st of December, the Sun is vertical on the Southern Tropic. Its apparent path to Northern observers is $23\frac{1}{2}$ degrees, forty-four Suns' diameters lower than the Celestial Equator. We have at Philadelphia, days of nine hours.

The path of the Sun at the Summer solstice is thus eighty-eight Suns' diameters higher than at the Winter solstice; the intermediate path, at the Equinoxes, marks the Celestial Equator.

The Dial, though designed especially for the Northern Hemisphere, when reversed at opposite seasons, represents equally well the Sun's declination for the Southern Hemisphere.

SECTION II.

The most prominent portion of the Dial represents the Sun's Declination at the parallel of Philadelphia, of which the Indian corn plant is the adopted pictorial characteristic. Of this the first section treats.

New York is about three-fourths of a degree North of Philadelphia; Boston is about two and a quarter degrees North. If we suppose the radii to be moved upon the Quadrant three-fourths of a degree more oblique, we have the angles of the Sun's Declination, for all seasons on New York city,—two and a quarter degrees more oblique, gives us those of Boston.

Baltimore is about half a degree South of Philadelphia; Washington city is about one degree; Charleston, S. C., about seven degrees, and New Orleans ten degrees South. In the same manner, if we suppose the radii on the

Quadrant to be moved half a degree, one degree, seven degrees, or ten degrees more vertical, they will represent the changes of the Sun's Declination, for all seasons at Baltimore, Washington, Charleston, or New Orleans, respectively.

SECTION III.

Comparative View of the Equinoctial and Solstitial Angles of the Sun's Light.

The comparative view of the Sun's Declination, which occupies the right of the Dial, represents the Sun's Declination, as it occurs at five parallels of latitude.

At the Equator, the Declination is equally divided. On both sides it has $23\frac{1}{2}$ degrees of inclination, which there means the same as Declination. At both periods of six months, the angle of the Sunlight, commencing at vertical, inclines to a declination of $23\frac{1}{2}$ degrees, and returns again to vertical. Both periods of six months are equally summers. This is not quite true, but it is for a cause, which will be treated in another chapter.

At the Tropic, which is a latitude of $23^{\circ}28'$, the angles for the Summer six months, commencing at $23^{\circ}28'$, diminish the North Declination $23^{\circ}28'$, and become vertical at the Summer solstice, and return again to $23^{\circ}28'$, on the 23d of September; while, for the winter six months, commencing at $23^{\circ}28'$, they add the South Declination $23^{\circ}28'$, making $46^{\circ}56'$, which is the angle at the Winter solstice, which gives in fact, and comparatively with our own latitude, the weather analogous to ours about the 12th of October, at Philadelphia.

At Philadelphia latitude, $39^{\circ}56'$, it is $39^{\circ}56'$ less, $23^{\circ}28'$ equals $16^{\circ}28'$, quite a tropical angle at the Summer solstice, and $39^{\circ}56'$ added $23^{\circ}28'$, equals $63^{\circ}24'$, quite a wintry angle at the Winter solstice.

At London, latitude $51^{\circ}28'$, it is $51^{\circ}28'$ less $23^{\circ}28'$, equals 28 degrees at the Summer solstice, and $51^{\circ}28'$ added $23^{\circ}28'$ equals $74^{\circ}56'$, at the winter solstice.

At St. Petersburg, latitude $59^{\circ}56'$, it is $59^{\circ}56'$, subtract $23^{\circ}28'$, leaves $36^{\circ}28'$, at the Summer solstice, and $59^{\circ}56'$, added $23^{\circ}28'$, equals $83^{\circ}24'$ at the winter solstice.

TABLE.

Actual angle of incidence, Dec. 21.		South Declination Dec. 21.		North Declination June 21.	Actual angle of incidence June 21.
$23^{\circ}28'$	South	$23^{\circ}28'$	Equator.	$23^{\circ}28'$	$23^{\circ}28'$ North.
$24^{\circ}28'$	"	$23^{\circ}28'$	1° N. Lat.	$23^{\circ}28'$	$22^{\circ}28'$ "
$25^{\circ}28'$	"	$23^{\circ}28'$	2° "	$23^{\circ}28'$	$21^{\circ}28'$ "
$26^{\circ}28'$	"	$23^{\circ}28'$	3° "	$23^{\circ}28'$	$20^{\circ}28'$ "
$28^{\circ}28'$	"	$23^{\circ}28'$	5° "	$23^{\circ}28'$	$18^{\circ}28'$ "
$33^{\circ}28'$	"	$23^{\circ}28'$	10° "	$23^{\circ}28'$	$13^{\circ}28'$ "
$43^{\circ}28'$	"	$23^{\circ}28'$	20° "	$23^{\circ}28'$	$3^{\circ}28'$ "
$46^{\circ}66'$	"	$23^{\circ}28'$	$23^{\circ}28'$ "	$23^{\circ}28'$	vert. T. of C.*
$53^{\circ}28'$	"	$23^{\circ}28'$	30° "	$23^{\circ}28'$	$6^{\circ}32'$ South.
$63^{\circ}24'$	"	$23^{\circ}28'$	$39^{\circ}56'$ Phila.	$23^{\circ}28'$	$16^{\circ}28'$ "
$74^{\circ}56'$	"	$23^{\circ}28'$	$51^{\circ}28'$ Lond.	$23^{\circ}28'$	28° "
$83^{\circ}23'$	"	$23^{\circ}28'$	$59^{\circ}56'$ St. P.	$23^{\circ}28'$	$36^{\circ}28'$ "
90°	"	$23^{\circ}28'$	$66^{\circ}32'$ Arc.	$23^{\circ}28'$	$43^{\circ}04'$ "

CHAPTER III.

THE SUN'S DECLINATION CONTINUED.

The Dial of the Seasons exhibits to the eye, not only the comparative obliquity and directness of the Sunlight at the Summer and Winter periods of the year, but also the comparative rapidity of the Sun's Declination at the Spring and Autumnal periods—the Equinoctial periods of the year,

* Vertical Tropic of Cancer.

—and its slowness as it approaches the solstices—portions of the year when the earth is sweeping the Northern and Southern curves of its orbit, and the sun's declination alters so slowly as to be said to stand still.

The Spring and the Autumn, are the West and the East portions of the Earth's orbit ; to us in the Northern Hemisphere, the Southern portion of the orbit is Summer—the Northern sweep of its orbit is Winter.

The Earth's motion is not in an exact circle. It has, to a small extent, an elliptical orbit ; this will be noticed specially in another chapter. We may now contemplate it as not greatly differing from a circle.

Let us, for illustration, compare the Earth in its orbit, to a horse in a race course. Let our position be the centre of the race ground. Let the course be divided into twelve equal divisions, corresponding to months. The earth, or horse, at the west point of its orbit, is moving south, and is then making south for a large part of its motion. For the first month, one twelfth of the circle, the southing is large, though the direction is slightly changed to an east direction. For the second month, the direction constantly curving east, the southing is much less. For the third month, the direction is chiefly east, the southing is small, and still diminishing, till in about ninety-three days from the west point, as it reaches the extreme south of its orbit, its course is due east.

Continuing its course, the Earth commences the East sweep of its orbit. Its motion, very gradually at first, but with a constant curvature, changes more and more into a north direction, till in ninety-three days, at the easternmost point of its orbit, it has a course North. This is the Autumnal Equinox.

Continuing its course northward, our Northern Hemisphere is rapidly thrown into the oblique light of Autumn and Winter, but curving continually into a west direction, the untiring planet reaches, in about eighty-nine days, the

Northernmost node of its orbit, its course being then due West. This is the Winter solstice.

Sweeping onward, its course, at first very gradually, but increasingly curves into a Southern one, till another period of eighty-nine days brings it again to the Westernmost point of its orbit, its course being south. The Spring, the vernal equinox of another year, is present in the Northern Hemisphere.

It is thus in accordance with the pauseless whirl of our planet, through an orbit of six hundred millions of miles, that spring time and harvest, autumn and winter, proceed in incessant succession.

We have alluded to the ellipticity of the Earth's orbit. From this, one of the results is, that the Sun is eight days longer on the Northern side of the Equator, than on the Southern. Our Summer is the aphelion portion of the Earth's orbit. The Earth is then more distant, and its motion is slower. Our Winter is the perihelion portion of the Earth's orbit. The Earth is nearer the Sun, and its motion is more rapid. Our Summer of the Northern Hemisphere is eight days longer than that of the Southern Hemisphere.

The Earth is three millions of miles nearer the Sun in our winter than in summer, but it is the oblique direction in which the angle of the sunlight reaches us, which gives us the diluted and feeble light of winter.

CHAPTER IV.

Explanation of the Pictorial basis of the Dial of the Seasons.

The pictorial portions of the Dial are designed to represent characteristic species of the plants and animals, and memorials of human civilization in their appropriate latitudes.

They are reduced from a large picture, of which they are but mere hieroglyphics, as the larger picture is but a very feeble hieroglyphic of the grand reality of the living landscape which it is designed to suggest to the mind of the reader.

Of the 100,000 species of plants known to naturalists, only forty species are very imperfectly and diminutively represented on the Dial. Each hieroglyphic may thus be considered to represent 2500 species.

Of the 7,000 known species of birds, two only are poorly delineated.

To do justice to the idea an entire picture should be chiefly devoted to each department of Natural History; for instance, one which should attempt to group, in their appropriate scenery in the uncaged aviary of Nature, the gay-plumaged birds of the Tropics, the songbirds of our temperate latitudes, and the hardy land and water-fowls, which inhabit the North.

The young seaman should endeavor to form a comprehensive idea of the ocean, covered with the canvas of commerce, veering to every breeze, as one grand continuous marine picture from the Equatorial, where, flecked with thunder-storms and coral islands, it is glowing beneath the tropical sunlight, to where, fading into twilight and darkness, the *Auroræ Boreali* coruscate from behind the rugged outlines of its polar icebergs.

The influence of climate upon man, upon the arts and necessities of life, upon intellectual and moral character, upon human history and civilization, is a subject of great extent and interest, to which whole chapters ought to be devoted.

At present we give only the names of the illustrations, commencing at the Equator. Mean annual temperature 88.

No. 1. The Banyan tree. 2. The Negro.

3. The Cochineal plant.

4. In the distance the Volcano of Cotopaxi in the Andes.
5. The Giraffe. 6th, 7th, and 8th group the Cardia Papaya—Palmtree and the climbing black Pepper plant.
9. The Elephant. 10. The Cocoa or Chocolate plant.
11. The Banana. 12. The Tiger.
13. The small plant whose root is the Ginger.
14. The Cocoa Nut Palm. 15. The Anaconda.
16. The Socotorine Aloe. 17. The Pine Apple.
18. The Coffee tree. 19. Sugar Cane.
20. The Rhinoceros. 21. The Orange tree. This is the Tropic emblem. Mean annual temperature 76.
22. The Palmetto Palm. 23. The scarlet Flamingo.
24. The Rice plant. 25. The Tea plant.
26. The Camelia. 27. The Date Palm tree.
28. The Pyramids. Cairo, Egypt, lat. $30^{\circ}2'$. New Orleans, Louisiana, lat. $29^{\circ}57'$. New Orleans and Cairo differ but five miles in latitude, and have a nearly similar Mean Annual Temperature of about 72. 29. The Camel.
30. The Temple of Jerusalem, Judea. Lat. $31^{\circ}46'$.
31. The Cotton plant of Commerce. The greenseed variety of Cotton grows well only within parallels of from about $31\frac{1}{2}$ to $33\frac{1}{2}$ degrees of N. Latitude. It is placed on the centre of this, lat. $32\frac{1}{2}$. 32. The Fig tree.
33. The Pagoda of Nankin, Central China.
34. The Buffalo of the North American Prairies.
35. The Tobacco plant. 36. The Olive tree.
37. The Parthenon at Athens. The Capitol at Washington is a few minutes north of Athens, so that they may be considered emblems of the same parallel.
38. The Peach tree.
39. The Indian Corn plant. This may be taken as the emblem of the Latitude of Philadelphia. Baltimore is but about half a degree South, New York is about three-quarters of a degree North of Philadelphia.
40. In the distance, the mountain perspective indicates

the Caucasian Mountains, which have given a name to the most intellectual variety of the human race.

41. Mount Ararat, which is a little South of the 40th parallel, is very nearly the exact latitude of Philadelphia.

42. The dark spot on Mount Ararat, the Ark. This is delineated as marking the locality of the patriarchal civilization, the vale of Shinar, the sources of the Euphrates and the Tigris, the fountains of sacred history.

43. The Vine. 44. The Colliseum of Rome.

45. The Horse. 46. The Apple tree. 47. Wheat.

48. The Pumpkin. 49. The Ox.

50. The Oak tree. 51. Sheep. 52. Barley.

53. The Church of Notre Dame, Paris.

54. Ocean and emblems of Commerce.

55. St. Paul's, London. 56. The Roe Buck.

57. The Potatoe plant, emblem of lat. Dublin.

58. Rye. 59. The castled hill in the distance, Edinburg.

60. The brown Russian Bear, lat. Moscow.

61. Fir trees. 62. Flax. 63. Hemp. 64. Turnips.

65. Oats, the most Northern of the Cereal grains.

66. The Birch tree. 67. The Larch.

68. The Moose Deer.

69. Hunter and dog after wild fowl, the wild goose.

70. Laplander and Reindeer.

71. Esquimaux and dogs. 72. Icebergs.

73. Polar Bear, the last animal at the North.

74. Man, who for short excursions penetrates farthest but gladly hastens back from the uninhabitable North.

75. Icebergs.

Ocean Scene, commencing at the Equator.

The moderately elevated Land, N. Lat. 3, is Cape de Norte, the mouth of the Amazon, East coast of South America.

The Mean Temperatures of warm parallels of the ocean are usually several degrees cooler than on land, in similar parallels.

The Mountain, lat. 7, is Adams' Peak, Isle of Ceylon, lat. $7^{\circ}6'$, North.

The ship, lat. 10, may be considered as a homeward bound East Indiaman.

The Palmtree island, lat. 13, is one of the horse-shoe shaped coral islands of the Tropics. The little boat is intended for a Malay prow.

At lat. 15 to 20, is represented a ship under close reefed topsails, and a Typhoon or Hurricane, one of those exaggerations of our thunder storms, which, though not of great extent, are very severe, and of which perhaps hundreds are at all times roaring over the tropical latitudes of the ocean. Thunder storms are less frequent in the temperate latitudes and very rarely occur in the North.

Lat $23^{\circ}9'$, is the Moro Castle at the Havana, which, as it is within twenty miles of the Tropic of Cancer, is used as a landmark of the Trópic.

The vessel lat. 25, is intended for a Baltimore clipper-built West India trading schooner.

The Mountain in the distance, lat. $28^{\circ}13'$, is the peak of Teneriffe.

The pagoda is intended for the pagoda of Nankin, China, lat. $33^{\circ}30'$.

Lat. $36^{\circ}5'$, is the rock of Gibraltar, with a Spanish boat in the foreground.

Lat. 38, a Greek felucca, the promontory of Sunium, with the ruins of the Temple of Minerva in the distance.

Lat. 40, an Italian polacre, Mount Vesuvius in the distance.

Lat. 43, a Genoese vessel, indicates the home of Christopher Columbus.

Lat. 44, may represent the largest American Man-of-War, the *Pennsylvania*.

Lat. 46, is the Great Western, the celebrated English steam-packet ship, from Bristol to New York.

Lat. 48, the sail on the horizon may be a Dutch vessel.

Lat. 49, a French Frigate.

Lat. 50° 8', the Eddystone Lighthouse, Lands-End of England, and a ship in a storm.

Lat. 53, on the horizon a Danish vessel.

Lat. 55, a Swedish vessel.

Lat. 57, a Prussian vessel.

Lat. 57° 38', the Skaw at the entrance of the Cattegat, mouth of the Baltic.

Lat. 59, a Russian vessel.

Lat. 60, a Norwegian vessel.

Lat. 62, an American Whale ship.

Icebergs.

Lat. 63, Mount Hecla in Iceland, an Esquimaux boat, a Polar bear on a field of ice.

Icebergs.

The Aurora Borealis.

CHAPTER V.

We are, to our own observation, in the middle of the universe. Our knowledge of what is around us must begin from a point of which we are the centre. Our own daily and yearly relations to the sun are the seasons of our own landscape; those of the different latitudes constitute the climates of the globe we inhabit. These are perhaps the first and most obvious and impressive lessons in terrestrial astronomy. To explain these is the purpose of the Dial of the Seasons. The Dial is an illustration of the sunlight as it falls on our planet.

GENERALIZATION OF THE LAWS OF LIGHT.

From the preliminary consideration of the sunlight, as it falls on our own planet, it is natural to pass to the illustration of the laws of light, as it expands in the universe, and to the *generalization of the laws of light*.

Light is subtle and ethereal; men differ as regards its nature. One thing is certain—the absence of light is darkness; it is the cause of which seeing is the effect. Without it, our noble sense of sight would be useless.

Light is a subject of unbounded extent and interest—equally worthy of our investigation, whether considered in the grand or the useful, the illimitable or the infinitely minute developments of nature continually occurring around us; or in the wonderful adaptation and exquisite susceptibilities of those organs of vision which receive its most minute and feeblest impressions, and by some inscrutable association with the operations of the mind, render them immediately subservient to the simplest wants of existence, or the most exalted efforts of intellect.

The present chapter chiefly considers light as it radiates in the universe.

From the properties, nature, and existence of light in our solar system, we derive laws which we shall attempt to illustrate, and which enable us to contemplate it as the *omnipresent traverser of infinite space*—pouring from its eternal reservoirs into a theatre where, only, its nature could be illustrated, and which it alone could illumine.

This sublimated ethereal substance, according to the inspired Hebrew historian, was spoken into existence by the first fiat of the Eternal, and originated in the incipient act of creative energy on rude and darkling chaos. Holding an intermediate relation to matter and immaterial existence, and triumphing in the inconceivable velocity and infinite extent

of its emanations over time and space, it is a sort of angelic messenger from the throne of the Omnipotent to the boundlessness of universal creation.

It is certainly the most magnificent prototype which physical creation affords of the omnipresence of Deity, and of the unity of that self-existent universal energy, which, while it "spreads undivided," and "operates unspent" in the worlds of matter and of mind, is continually revealing to intelligent creation the infinity and benignity of creation's Author.

Mankind, in the earliest ages, as by universal consent, had invested light with the attributes of divinity. The most barbarous nations of both hemispheres, as well as those on the Delta of the Nile, the plains of Chaldea, the mountains of the Caucasus, and the shores of the Ægean and the Adriatic, worshipped the sun as a benignant deity from their earliest traditions.

The planets, and the starry vault beyond them, as their periodical revolutions marked the lapse of time, and the returning seasons of seed-time and of harvest, to the transient generations of men, could not but inspire a degree of sublimity and of devotional sentiment among the rude wanderers on the banks of the Missouri, the Niger and the Ganges, as well as among those nations whose mythology and whose rapturous poetry had taught them to view the constellations of Heaven as no other than the resting-places of their translated heroes, and the happy abodes of the immortals.

The examination of the physical properties of Light was, however, an investigation but little known to the ancients, and our present knowledge has been a gradual consummation of the experience of many ages.

Of the philosophers of antiquity, Plato was the first who has left us any observations on the subject. He considered vision to be occasioned by minute particles, continually fly-

ing off from the surfaces of bodies, which met with other particles proceeding from the eye.

This doctrine, if we may venture the suggestion, appears to have been the basis on which his pupil, Aristotle, subsequently founded his favorite theory of Ideal forms, "Phantasma," or Species, a celebrated doctrine which was cherished as a sacred legacy, by the philosophers of nineteen centuries, and may be referred to as one of the most remarkable proofs which history affords of the tenacious influence of received dogmas, sanctioned by authority and the assent of ages.

In order to account for our intellectual consciousness of the color and outline of objects, Aristotle supposed the existence of a sort of semi-material phantom or image of every thing, perfectly like the original in every respect, but possessing a power of acting as a medium between gross matter and our intellectual perceptions. Thus creating a duplicate of nature in order to understand creation as it exists.

Our words Idea and Species are enduring relics of this remarkable theory. The example of Aristotle has been not unfrequently followed by the philosophers of the subsequent ages, who have often succeeded in establishing theories, by placing at proper distances their intervening phantasma, and thus led on their confiding followers to most erroneous conclusions.

Des Cartes considered Light as an *invisible* fluid, present at all times and in all places, but requiring to be set in motion by the presence of fire, or some other cause capable of exciting it.

Malebranche, another French philosopher, offered a modification of this theory. He supposed Light to be communicated by a sort of vibrations, in a manner analogous to those of sound. The impulses originating from the presumed motion of the particles of luminous bodies among

themselves. As, for example, the flickering of flame, the agitation of water, or the intellectual or phrenal vibrations of Dr. Hartley.

But to develop the true nature of this most interesting substance, was reserved for the illustrious author of the immutable doctrine of gravitation.

Sir Isaac Newton concluded that light is a material agent, not fluid, but consisting of infinitesimal particles, and endowed with a repulsive energy, the reverse of that which governs the grosser forms of matter. An energy which causes it to radiate with inconceivable velocity, *in straight lines* from the point of emanation ; i. e. the luminous body.

Attempts to ascertain the degree of the velocity of the motion of Light, were made by Galileo early in the 17th century, by experiments at known distances on the Earth's surface. But he found it impossible for him to detect any observable difference from absolute instantaneousness.

Roemer, a Danish astronomer, patronized by Louis XIV., in the course of his observations on the immersion of Jupiter's satellites at different periods of the year, and when the Earth was in different portions of its orbit, discovered that those satellites are seen to be eclipsed when the Earth is in the portion of its orbit nearest to Jupiter, eight and a quarter minutes sooner than the calculated time ; and that when the Earth is in the opposite portion of its orbit most distant from Jupiter, these eclipses happen eight and a quarter minutes later than the true time. He thus ascertained that the motion of light is not instantaneous, but that it occupies about sixteen and a half minutes in passing over, or through a space equal to the diameter of the Earth's orbit ; and consequently, that the light of the Sun occupies eight and a quarter minutes in passing to the Earth, which is about two hundred thousand miles per second, or twelve millions of miles per minute.

Doctors Halley and Bradley have since confirmed these

results. The objections suggested by Dr. Franklin, have been satisfactorily answered, and they are among the received data of astronomers.

It is therefore, probable, that if the more distant planets in our system had not existed, the velocity of Light would never have been observed.

Dr. Horsley has estimated the ultimate particle of light at less than one millionth of a cubic inch.

The Chevalier De Arne has concluded that a continuous sensation, or consciousness of light, may be produced on the retina of the eye, by the arrival of a particle of light every seventh of a minute.

On this hypothesis, the distance in space of the successive particles of light on the same line, will be thirty thousand miles.

Every conceivable or observable point of the Sun's surface must be a distinct radiating centre; and every point of the Moon's surface a reflecting centre. This is evident from the fact that a small opaque or less radiant spot on either is readily perceived. The velocity of direct and reflected light are considered to be equal.

Huygens, a Dutch Astronomer of the seventeenth century, suggested that there might be "stars at such an immense distance, that their light had not yet travelled down to us since the Creation."

This hypothesis has not been disproved; it is in fact sustained by the observations which the elder Herschel, by means of his gigantic telescopes, has been able to make in the remote ultra-planetary space.

The idea of Huygens pictures but a solitary pencil of light, travelling from some immensely distant star for six thousand years, at the velocity of twelve millions of miles per minute, but not yet having reached us, to make its origin visible at our Earth. It is only *generalizing* this idea to believe, that the first created light of our sun, and that of

every other star in the firmament, still extends itself in all directions into illimitable space: maintaining, in all its wondrous inter-radiations, the distinct proportionate visibility of its innumerable suns, at any and every point of infinite space where the eye of an observer or the lens of a telescope can be imagined to exist.

This view of omnipresent minutely inter-radiating light is important to science, if it disproves, as it not improbably does, the undulatory theory of light which many modern Astronomers, among whom are Whewell and the younger Herschel, have been inclined to entertain, and restores to well deserved authority the Newtonian doctrine. Neither theory, however, can at present be considered as established.

For the purpose of aiding in the illustration, we have introduced in the present chapter the following stanzas which perhaps may not be inappropriate.

THE CREATION OF LIGHT.

And God said: "Let there be Light—and there was light."

I.

Instant, o'er heaven, from every sun and star,
Flash'd the centrifugal, ethereal Light;
The planets glittered in their paths afar,
And darkness vanished at the dazzling sight.

II.

And thence far—far that darkness hastes away,
Where our sun's starlight dawns in boundless space;
And many a distant sun's primeval ray
Toward us is speeding on its pauseless race.

III.

A hundred millionth part of Solar light
 Illumes our planets in their kindred race ;
 All, save this fraction of its radiance bright,
 Glances beyond them into boundless space.

[The portion of the sun's radiant light, intercepted by and received upon our earth's convex, is demonstrably less than one twenty-two-hundred-and-fifty-six millionth of the whole; that of the eleven planets is in the aggregate less than one hundred millionth of the whole. It follows that ninety-nine millions nine hundred and ninety-nine thousand nine hundred and ninety-nine parts of the whole sunlight passes beyond the limits of the solar system, illumines the ultra planetary space, and reveals the existence of our sun to other systems, the central stars of which appear to us among the remoter stars.]

IV.

What is our little planet's day and night ?
 The day, that dazzles human eyes with glare,
 Checks not the interglance of starry light—
 It beams incessantly forever there.

[The stars, except those near the sun, are at all times in very clear daylight mirrored in the limpid waters of deep wells; they are also visible at mid-day, reflected in the mountain lakes of northern latitudes, and especially when lofty and precipitous banks exclude all but the vertical light. The telescope, a chimney, or any opaque tube which entirely excludes the surrounding light, makes the stars visible from similar causes. When an observer, of a sunny day, shades his eye by placing his hand over it, it is to exclude the more direct rays, and thus to enable the less strong reflection of the distant landscape to be more visible. The tin tubes blackened on the inside, which we use in looking at pictures, are useful for the same reason.

[The use of tubes, extending by uniting them to a great length, were known to Ptolemy and the ancients; but Metius, of Alcmæer in Holland, was the first who added glasses; thus inventing telescopes in 1609, which were successively improved by Galileo, Huygens, Newton and others, to the time of Herschel.]

V.

We roll into Earth's shadow; and 't is night
 To us—our side the orb is from the sun;
 One half 's in shadow always—one in light;
 Evening and morning since the world begun.

[One half of the earth's convex landscapes being always in light, and the other in shade, the earth's daily rotation on its own axis rolls us into and out of our own shadow, causing day and night. The earth, rolling from West to East on its own axis, it is always mid-day and midnight at opposite meridians of longitude, and an eternal sunrise and sunset at the intermediate meridians.]

VI.

One half in day and summer light
 The eternal changeful seasons turn ;
 One half in shade and winter night
 The varying landscapes freeze and burn.

[The preceding stanza illustrates the relations of the sun's light, caused by the earth's daily motion on its poles. This stanza refers to those changes which result from the earth's annual motion round the sun, and are caused by the inclination of the earth's polar axis to the plane of its annual path in its orbit, (the Ecliptic.) As only one half of the earth's convex landscapes can be in sunlight, it is obvious that day and night, and summer and winter, in all their varieties, must alternate constantly in the alternate hemispheres. As on a given parallel of latitude, that is on a line drawn East and West round the earth, mid-day, sunset, midnight and sunrise are always present—so of a line drawn North and South round the earth—one half must be in sunlight, and the other in shade. There can be but one point where the sunlight falls vertically from the zenith, on the earth's surface. About six thousand miles, or one fourth of the earth's convex, from this vertical point, West—it is sunrise—six thousand East, it is sunset—and also six thousand miles North or South from this vertical ray, the sunlight must be falling parallel with the earth's surface, both in the arctic and antarctic latitudes.]

VII.

Myriads of sunbeams interweave their light,
 Throughout the boundless distance of the sky ;
 And gem the spangled canopy of night,
 Where'er the wanderer turns his thoughtful eye.

VIII.

The furthest starbeam's telescopic flight,
 Direct, unerring from its centre runs ;
 Threads the vast maze of inter-radiant light
 Athwart the day-source of a thousand suns,

IX.

On every side each distant sun displays,
 Across the daylight of each other sun,
 Its radiant sphere of still expanding rays,
 Widening and widening e'en since time begun.

X.

The feeblest starbeam in its furthest flight,
 Across the dazzling dayfires of the sky,
 Truly reveals its centre and its source
 Unscorched and changeless to the gazer's eye.

[Stars, single in appearance to the naked eye, or with telescopes of smaller power, when you use telescopes of greater power, are continually discovered to be double stars; that is, two stars so nearly in the same line of vision, star behind star, as only to be seen separately by the use of lenses of increased power. This remark may also apply to those larger clusters of stars which appear to the eye as nebulae, or bright cloud-like spots of white light, but which are ascertained to be stars so nearly in the same line of vision as to appear like aggregations of stars.

[Herschel's telescopes reveal star behind star, constellation beyond constellation, clusters and clouds of stars appearing such from their immense distance, but in reality all suns. Let us consider the most distant of all—the light of this most distant star, radiating through the maze of inter-radiating light of every other star, and through and across the very daylight source of many of them, reaches the eye unaltered, and if the idea of heat is inseparable from sunlight, “unscorched.”]

XI.

E'en when the student swings great Herschel's lens,
 Measuring in mighty tracts concentric space;
 Each telescopic sun his vision kens
 Further and feebler has its certain place.

XII.

In Cancer, or in Leo, as we roll,
 One starry baldric fills the midnight air;
 Whether we view the Zodiac or the Pole,
 The constellated suns of space are there.

XIII.

As fades a stone's splash in the waves around,
 Though suns may darken at light's starting place ;
 While ages roll, and cycles wheel their bound,
 Light speeds, centrifugal, its onward race.

[This alludes to the alleged disappearance of certain stars, as the lost Pleiad.]

XIV.

Heaven's vast machine defies the optician's art,
 Naught but Omniscience its depths may scan.
 What man may know is but a little part,
 All unrevealed to him the glorious plan.

XV.

Author of All! Almighty, yet unseen,
 Wondrous, surpassing wonder Thou must be,
 Thou veil'st thyself beyond the starry scene,
 The light thou mad'st reveals thy works, not thee.

XVI.

Thy Omnipresence shrouds itself in light,
 Where its bright rays illumine the furthest sky ;
 The tiny shadow of Earth's little night
 Hides nothing from thine ever seeing eye.

[The shadow of a planet, as of Venus, or of the earth, is its shadow, which always exists on the side from the sun, and our rolling into and out of which causes day and night to us. It obstructs the whole sunlight no more than a raven's wing in the furthest horizon.

[The same laws of radiation from each point to every other point—the same wonderful inter-radiations—are true of reflected light. Let us suppose a million of observers on a mountain side—above them the Heavens—before them a rich and varied landscape. Each observer, if he looks upward, receives on the expanse of the nerves of vision a daguerreotype of the constellations. If he looks forward and around, he has a changing daguerreotype of the landscapes. The daguerreotype of the constellations may, it is true, be obscured by the daylight of our own star ; but it is not the less certainly there.

[Provide each observer with telescopes of great power ; each and all can

now analyze the celestial area, and fix upon any one of the telescopic stars. Its feeble light is present to all.

[Each and all in concert can next analyze the landscape, and reduce its vast variety to distinct vision. They can, with a common portable engineer's telescope, see the same man forty miles distant. The eye is the most delicate and accurate of optical instruments. The telescope lengthens the darkened vestibule of its camera-obscura like chamber, and thus more effectively prevents the interference of lateral light. The most complex perspective, the most exquisite foliage of the distant landscape, which would be perceptible only by a telescope of a thousand powers, are unquestionably pictured with perfect exactness upon the eye of the rudest observer. The rapidly changing, yet invariably accurate inter-pencillings of the rays of light, falling in straight lines, as Newton considered them, appear sufficiently incredible, without adding all the zig-zag confusion which the undulatory theory superadds to the phenomena of vision.]

The entire co-instantaneous action of the laws of light and of gravitation, existing in the expanse of the Heavens, the phenomena of day and night and of the seasons, the whole vegetable and animal world in all climates and latitudes, and one thousand millions of our fellow creatures all coterminously existing, as light and shadow succeed each other, in pauseless succession, on the revolving globe, is too vast an idea for immediate conception. It is a subject of deliberate study; and to make this study more easy and popular, is the design of the present pages.

A vivid and adequate idea of our own planet is, we conceive, an indispensable introductory to the comprehensive conception of the vast scene of the Heavens around us. The most distinguished of astronomers, Kepler, and Newton, and Laplace, have incontestably demonstrated the proportions of our earth to the solar system to be so exceedingly small that at the larger and more distant planets, of which our sun is the centre, the earth would be absolutely invisible to the human eye. Jupiter is 1,400 times the bulk of the earth, and the visibility of the earth at Jupiter is, of course, in proportion; it is that of an orb $\frac{1}{1400}$ of the bulk of Jupiter, as it appears to us.

The greatest mathematicians—the most distinguished

adepts in the laws of proportion and the relations of numbers, and in those abstract symbols and modes of calculation which establish, on irrefutable data, the most amazing results in the vastness of the universe around us, we are inclined to believe, from the narrowness of the human intellect, have hitherto seldom combined, with their profound contemplations of the Heavens, an adequate conception of their native planet—

“One science only does one genius fit,
So vast is art, so narrow human wit.”

Or at least they have not been so happy in their illustrations as to leave nothing to be desired.

Having thus briefly opened, we shall defer this portion of our subject and the further important illustrations which belong to and arise from its consideration, till after several other chapters, which, perhaps, are essential to the scope of the co-existent Drama of Nature.

CHAPTER VI.

A DAY—THE DIURNAL REVOLUTION OF THE EARTH ON ITS AXIS.

We are living upon the Earth, one of the eleven planets which revolve round our Sun. Although the Earth is very small in comparison with some others of the planets, being as we have noticed in the preceding chapter, only $\frac{1}{14700}$ of the bulk of Jupiter, and is such a mere speck in comparison with the spaces of the Solar system as to be receiving only about one twenty-two hundred and fifty six millionth of the whole Sun's light; yet, compared with our feeble means of observing and exploring it, it is an orb of immense magnitude, whose parts have not yet been entirely explored, and whose varied productions seem almost infinite, so as afford a field of investigation exhaustless to human industry. Even if, for the sake of better observation,

an observer direct his especial attention to one department of nature—vegetation for instance—he could expect, during a long life, to see but a part of the variety of trees, and plants, and flowers, and mosses, which flourish in all parts of the Earth.

Our notions of distance and extent are gradually acquired. The streets of a town, the fields of our father's farm, the adjoining farms, the encircling hills of our native valley, are the world which dawns upon childhood. The path to the schoolhouse, or to a neighbor's, is perhaps the first geographical acquisition. A ride of a few miles, a day's journey, maps, books, numbers, aid in forming our earliest impressions of extent and distance. On maps the position of our home is pointed out to us, and the divisions, rivers and outlines of our own country. At length we begin to notice, in connection, the positions of countries and continents, and to form some idea of the globe itself. The present chapter is designed to aid us in forming a mental picture of the extent and of the diurnal motion of the Earth.

The Earth is a globe about twenty-five thousand miles in circumference. One half of it is always in Sunlight, the other half is not in sunlight, but in starlight. All parts of it are in starlight, but those persons who are in the sunlight do not see the stars. It is only when that part of the earth on which we are, turns into its own shadow that we can see the stars. But they are always there, and shining in the day time, though the strong light of the Sun obscures them to our vision.

The sunlight is falling vertically from the zenith but at one place, or as mathematicians would say, one point. From this point it falls more and more obliquely on all sides till you approach the edge, where it is horizontal.

At the distance of about six thousand miles, one fourth of the Earth's circumference from the vertical point West, the Sun is rising; six thousand East, the Sun is setting.

Also, six thousand miles North or South from this vertical ray, the sunlight is falling parallel with the Earth's surface, both in the Arctic and Antarctic latitudes.

The angle at which the sunlight is falling, is the primary cause of the seasons and climates in all their varieties and vicissitudes. Its more vertical rays are constantly maintaining the glowing splendor, the exuberant vegetation and the swarming life of the tropics, while its oblique rays are diffusing a feeble fading light on the dreary and frozen regions of the Poles.

Our position at Philadelphia is such, that about two thousand seven hundred and seventy-seven miles south of us is the Equator, which is the centre of the Sun's influence midway between the cold Poles. A similar distance North of us takes us far beyond all human habitations, and almost beyond all animal and vegetable life, far upon the Polar ice. Our latitude is on the middle ground between the extreme heat of the vertical Sun, which is always existing South of us, and the extreme cold which is present at the North. South of us, toward the Equator, the forests are characterized by several hundred species of palm trees, on which are at all times nestling thousands of species of birds of brilliant plumage. Around us are the oak tree forests, and the scenery of the temperate latitudes. North of us are the fir trees, the reindeer and the Esquimaux, and beyond these, deserts of unexplored and unexplorable ice.

Every one has heard of the Earth's turning round on its axis every day. The fact is universally admitted, but very few persons have an adequate idea of so vast a truth.

The Earth, as it rolls round from West to East, is continually sweeping its Eastern landscapes into the sunlight, while its Western landscapes are proportionally receding into sunset and shadow. Thus an eternal evening and an eternal morning are perpetually present.

For the purpose of illustrating in some degree the extent,

scenery, and daily motion of our earth, I shall ask you carefully to follow a very simple narrative of my own course of thought as it actually occurred.

It was the evening of a delightful mid-summer day. Before me was a landscape, familiar to my childhood's recollections.

The sun's last effulgence was lighting in tints of gold and purple the western horizon, when this simple reflection occurred to me: he is leaving our Hemisphere in darkness, but his bright rays are at this moment dawning on the other side of the earth, and illumining the landscapes of the Eastern continent; the bland light of morning is breaking on the mosques of the Ottoman; the worshipers of Allah, the devotees of Mahomet, are performing their orisons; the Arabian herdsman and the Persian caravan-driver are hailing in prostrate reverence his rising beams, in worship to the God of their fathers; at this moment he is shining in meridian splendor on the vast expanse of the Pacific ocean; yet at this same moment the inhabitants of Europe are buried in the unconscious slumbers of midnight. While on this side of our revolving planet, the shadows of evening are inviting us to repose; on the opposite side the blessed light of morning is breaking the slumbers of all nature, refreshed for the renewed enjoyment of existence. Thus, morning and evening are perpetually present, and chasing each other over earth and ocean, with the astonishing velocity of a thousand miles an hour, and completing the earth's circumference in what we call a day, or in each complete revolution of the planet on its axis.

Let us gaze for a moment on the setting sun. Let us now imagine ourselves to be elevated a short convenient distance above the earth's surface, and that the attraction of gravitation is so modified in our favor that we may remain during twenty-four hours, while the earth should roll round beneath us. Accompanying the earth in its annual, but

not in its diurnal motion, we shall thus have a sunset scene all round the planet; before to-morrow evening, a bright vision of land and ocean 24,000 miles in extent, a landscape, a living panorama, with all its human, animal and vegetable tenants as actually co-existing, encircling the whole globe, will have passed beneath us.

In order to realize this picture, we should select some well known position, embracing if you please the scenes of your infancy, or those with which you are most familiar. For example: the spire of the Hall of Independence, Philadelphia; the cupola of the State House, Boston; the Capitol, at Washington; St. Paul's, London; the Kremlin, Moscow; the cliffs of the Missouri; a cottage of the upper Alps; the peak of Teneriffe; a summit of the Andes or Himalaya; take whatever point you please.

If you leave the choice to me, however, I will select Philadelphia, my own native city.

Let us then suppose ourselves to be elevated as before stated around the spire of the Hall of Independence, on a fine summer evening, and that fine evening to be this present moment.

We have beneath us the actual scenery with all its bustling residents in real life—the living panorama of the hour, with all the combined associations of society, of commerce, of childhood and of home.

It may be proper to remark here, that the rapidity of the earth's actual rotation, seventeen miles per minute, one quarter of a mile to each second, is much too great for our purpose of attentive observation—therefore, we must suppose it to move only so fast as we may incline to proceed in the survey. The distinctness of the idea you will be able to form of the revolving picture, will of course be more or less complete, in proportion to your previous facilities of observation on men and nature, and the attention with which you have improved them.

To illustrate this by an example : in a stage coach or car passing between Philadelphia and New York, or in a vessel gliding beneath the majestic banks of the Hudson, the Ohio, or the Rhine, every traveller passes the same scenes, and sees to a great extent the same objects, the same group of fellow passengers, every ox in the adjacent meadows, every tree, every rock, every flower by the wayside is pictured to the vision of all. The whole scene forms a moving daguerreotype to every eye, but the various intelligence, the contrasted pursuits, the predominating passions of each individual, direct his attention to different reflections; one notices the crops particularly, another the buildings, another the vessels; one is entranced in love's potent enchantment, another is thinking of his absent friends, others are meditating some commercial or political project, one is elate with success and hope, another is sad with the sorrows of his condition. It would require even more than the powers of the myriad-minded Shakspeare to observe, comprehensively and discriminately, the scenes of life around them. While we are noticing one thing, myriads are escaping us.

But the scene below is moving. My native city, the home of my childhood with its spires and the smoke of its thousand firesides, is gliding under us toward the Eastern horizon, while its suburbs, the Schuylkill, with its coal-blackened wharves, its coal ships and its beautiful bridges, approach us from the west, and the farms beyond, each with its cultured fields and its domestic scenery, the ploughman whistling at his labor, or loosing his tired horses, the cattle grazing in the meadows, the poultry gathering to their roosting place, the cows ruminating in the yard, the rosy milkmaid singing at her task, "the playful children just let loose from school."

The summit of every hill reveals to us a fresh landscape, ever-varying scenes of rural beauty, chequered with all the actual incidents and interest of the evening hour. In these

delightful valleys, the descendants of the colony of Penn enjoy probably more than average contentment. We witness, however, the realities of human life, the hopeful dreams of youth, the toil and thoughtfulness of manhood, the gambols and prattle of infancy, the follies and virtues of every age, the results of industry and indolence, of temperance and benevolence, of sensuality and of selfishness, are all before us. We see every thing precisely as it is.

The beautiful village of Westchester, reposing amid delightful agriculture, the frequent succession of farms where the rivulet-sources of the Brandywine, alternately margined by exuberant woods and grassy meadows, are winding amid cultured hills where the ploughshare has half-obliterated entrenchments, memorable in American revolutionary annals, give place in a few moments to ranges of more extensive valleys celebrated for their limestone fertility, and the admirable cultivation of the German settlements.

The streamlets now beneath us are those of the Conestoga. The provident industry of men descended from one of the most industrious races in Europe, has here spread a bright and luxuriant carpet of crops over a soil of unsurpassed productiveness. The setting sun calls the happy husbandman from his labors, huge wagons groaning beneath golden sheaves, and drawn by noble horses, are everywhere tending homeward from the wheat fields, to barns of palace-like proportions.

The scene beneath us is the county of Lancaster, proverbial for its agricultural beauty and fertility. The somewhat antiquated town you notice on the right, approaching us, is Lancaster city; twenty years since, the largest inland town of the republic, but now, far surpassed by the modern cities of the West. The simple structure of its time-worn dwellings, and the contented physiognomy of its industrious citizens, remind one of their descent from the fatherland of the Goths. That old house yonder, with the

moss-covered roof, is the birth-place of Robert Fulton, and around it beneath those trees were the earliest scenes of his infant pastimes.

You may now observe in the horizon before us, the first smaller ridges of the Alleghany mountains; the fragrance of a thousand hay fields, the joyous song of the reaper, the measured tread of the athletic cradler, the luxuriant orchards, the groves vocal with the evening songs of happy birds, glide rapidly onward under us.

Yonder! amid glorious amphitheatres of landscapes glowing with the benignant bounty of harvest, and studded to the hill tops with rich barns, cottages, and luxuriant forests, is that loveliest of American rivers the Susquehanna. There it is! coming with its forest-skirted shores, and delightful islands, its cultured valleys and its bold mountains, its broad volume rushing beneath giant bridges, gleams sweetly in the placid light of evening.

Do you notice just beyond the wood, near that half-shaded cottage on the hill side, an old man leaning on the fence? He is an old Switzer, a patriot soldier of the Swiss cantons. His hair is thin and white. The soil on which he stands is his own. When the French eagles subjugated the liberties of his country, he left the valleys of his fathers a voluntary exile, and has here found a home for his children.

That somewhat bent figure you can just recognize where the road winds over the hill which is approaching us, is a veteran of the army of Egypt, who, having followed the brilliant career of the First Consul, over the glaciers of St. Bernard, the vineyards of Italy and the sands of the desert, and having since survived the desolating pestilence and the bloody campaigns of St. Domingo, dwells amid these scenes of culture and solitude, musing as did the Emperor at St. Helena, on the recollections of the past.

The town approaching us on the left is York. When,

during the war of the Revolution, Philadelphia was occupied by British armies, the fathers of the Republic by the advice of Washington retreated to the interior, and York was for some months the scene of their councils.

Harrisburg, the finely situated capital of Pennsylvania, passes us a few leagues to the north, too distant for accurate observation. Had our starting point been one degree of latitude further north, there would already have passed beneath us the coal regions of Eastern Pennsylvania, where the anthracite, in strata of extraordinary thickness, crops out on the sides of mountains, traversed by the tributaries of the Delaware, the Lehigh, the Schuylkill, and the Susquehanna, and accumulated in the ample repositories of nature, awaits in exhaustless abundance the wants of future ages.

We have now beneath us the wild scenery of the Juniata, winding in the mountain ravines, its beautiful little valleys forming a charming contrast to the dark precipitous rocks, and forest-covered solitudes. Yonder you may trace the line of the Pennsylvania canal. Those boats are laden with the products of the West. The music you hear is the horn of the boatman echoing sweetly in the wild passes before us.

The road which winds around the mountain, has been cut with great labor, along frightful precipices, while far above the white-headed eagle wings his solitary way to his lofty eyrie.

The dark ranges of the mountains, clothed with gigantic forests, like a vast billowy ocean of verdure, sweep in solitary grandeur beneath us, where occasionally groups of girdled timber stretching their storm-blanchèd branches toward heaven, the lonely cabin of a hunter, scarcely visible amid the blackened half-burnt stumps, and a few scattered villages at long distances in the valleys, break upon the exuberant wilderness.

It will, of course, be necessary that we should alter our elevation, as the mountains and the river sources approach us. I did not wish to trouble you in the first place with the details of the necessary mechanical part of your outfit, but you have attached to your shoulders a pair of wings, so contrived, as to enable you gracefully, and with slight bird-like exertion, to alter your elevation at your pleasure or convenience. If you wish to examine the general surface and topography of the country, we will choose an elevation of some thousands or tens of thousands of feet, where you will find the telescope in your belt useful—when you are disposed in our long future survey especially to notice the inhabitants of the respective countries, the characteristics, occupations, civilization, costumes of the nations, you had better unceremoniously approach very near and salute the inhabitants; the cosmopolitan trumpet you have slung on your breast, will enable you to converse in any language and inform yourself on every subject.

When you wish to acquaint yourself with natural history, and to examine the flowers and insects of earth's countless valleys, or the crystals or mosses of the mountain rocks, you may apply your microscope deliberately, and you will soon learn to accommodate yourself, by a mere act of volition, to all varieties of surface, raising yourself just sufficiently to allow objects to slide beneath you, now penetrating the deepest shaded ravines, now skimming the untrodden precipices of the mountains, now soaring above the clouds, and thus you will always be able to view, in its natural position and habitudes, every object at the proper distance and best adapted light. The lesson of our survey is the co-instantaneous existence of all things at this moment. We read in books of travellers of what appeared and happened in distant parts of the earth, years ago. We are now to see and to study all things as they exist to-day, at this passing instant of time.

The actual, stupendous, quiet rotation of the planet, though too rapid for detailed observation, may be illustrated from any commanding summit. The mountain islands and the mountain coasts of ocean are visible to the mariner at the distance of one or two hundred miles. The view from the peak of Teneriffe, or the heights of Mount Olympus, is not less than one hundred and fifty miles, or three hundred miles in diameter, or one thousand miles in circuit; now as one thousand miles an hour is the rate of the Earth's rotation, an observer on these positions, directing his attention to the horizon around him, would occupy at the same rate one hour in the survey.

In like manner an observer on an eminence commanding two and a half miles of view in every direction, which is five miles in diameter, and fifteen miles in circuit, would at the same rate be allowed one minute to survey the scenery around him.

This may be well and practically illustrated by any observer in scenes of intermediate extent, say of fifty to one hundred miles circuit, as the valley of Wyoming, or of Tempe, the bay of New York, or of Naples; the rate of near four seconds to a mile, or one quarter of a mile to each second, which is the actual rate, when the scene is somewhat extensive, will be found ample for all the purposes of general topographical observation of the landscape. At the distance of several miles we should see the mountains, cities and rivers, as on a map.

The mountain air sustains a vigorous vegetation. Do you notice what a noble forest covers the summits and clings to the steep acclivities of the torrent-cleft ravines?

On the highest ranges a giant growth of chestnut and cherry combines with the beech, the poplar and the oak, to form masses of forest; towering above these the tall conspicuous white pine is interspersed and often predominates, covering vast tracts of the landscape with a dark

perennial shade, while the hemlock, fond of humid situations, covers with a deeper shade the precipitous glens and swampy intervals of the streams.

Look yonder, a wild cat is peeping from a hollow limb of that dead-topped white oak. In the morass of the ravine below us the bear cools himself at mid-day, the squirrels skip among the trees, the pheasant clucks to her brood, the fawn gambols by his dam, the song-birds are singing their vesper hymns of gratitude. Where the stream eddies beneath the root of that old beech tree, the otter is watching the trout sporting below him. 'Tis mid-summer; the shad of the Chesapeake, after pursuing an industrious and devious pilgrimage from the ocean, has here arrived, conformably to the eternal instincts of his species, to pay his yearly visit, at the season when the mountain laurel blossoms by the cool fountains of the furthest Susquehanna.

Over some tracts of the mountain wilderness, the tufted foliage of the forest is grouped in ever-varying variety; in others, groves of different trees alternate with each other, in masses, and contrast from afar, shading, in receding perspective, the exuberant outline of the mountains. The curvature of the summits swells in vast undulations, graceful as those of ocean, while occasionally abrupt cliffs lift themselves from the billowy verdure. Over the scene below us, at this moment a heavy thunder shower is passing away, the sunlight is resuming its gladness, the dense clouds sweeping in dark drifts over the showery landscape, cast their flitting shadows on the dewy, brilliant amphitheatre before us, while a glorious rainbow is reflected on the retiring shower, behind the eastern hills. Amid the vivid pea green of the beeches and maples, you may notice those dull green, storm-scathed summits of the old hemlocks, which have survived for many ages, and whose annals, "if there were tongues in trees," would recall the fierce ambition and the tranquil loves of many an aboriginal chief-

tain, ere the brave, forest-destroying race of the Anglo-saxons had dispelled the domain of the native red men o'er the proud forests of these thousand mountains.

We now look down on the hills of western Pennsylvania, traversed by deep ravines shaded by the unbroken forest, or luxuriant under far spread cultivation.

Below us are strata which comprise the bituminous coal measures. On the north the mountains swell in gentler undulations and at length blend into the fertile plain which extends toward the borders of the Lakes.

On the South, as you may notice, we have still present the wild and precipitous outcrop of the sandstone formations which embrace the coal strata.

Yonder, where the deep forest ravine of Turtle Creek breaks the heights of the Monongahela, moulder the bones of Braddock, with those of the wolves who feasted on his unburied soldiers; it was here that the youthful Washington saved a remnant of the army from the scalping knife of the Indians, and the labyrinth of these awful forests.

The little forest springs, and meadow-spring-house streamlets beneath us, are sources of the easternmost tributaries of the far draining Mississippi. You observe that the country is more cultivated, and the frequent scenes of harvest home, alternate with the masses of forest and become the most interesting feature in the sunset landscape, till amid the high picturesque banks of the three rivers—the flag of old Fort Pitt, and the dense smoke rolling up to heaven from the thousand furnaces and steam-power factories of Pittsburg—the canal boats and arks, and bridges, and fleets of steamers from the far windings of the “father of waters,”—and now the present panorama of the city, with the noise of its tilt hammers and the hum of its people, sweeps beneath us.

The valley of the Ohio, (the beautiful river, as the red men truly named it,) glides on. The mellow light of even-

ing falls enchantingly on hill and vale. Groves of the old forest, village scenery, countless successions of farms grouped with the industry of harvest, the happy homes of your own countrymen, and fair faces on which to linger, would be to love, beaming on you at intervals from their cottage doors, amid scenery beautifully diversified and everywhere bright in the rich verdure of the Summer Solstice, pass swiftly by. We have no time to pause. We are viewing in rapid succession the luxuriant valleys of the Muskingum and the Scioto, the Miamis and Wabash, the Kaskaskia and Illinois, where the luxuriant forest and the wandering savage, the Anglo-American hunter and the pioneer woodsman, have given place in one generation to scores of villages and cities, abounding with the arts and luxuries of civilized life.

We are now approaching the Mississippi, above the confluence of the Missouri, that junction of mighty waters. A thousand rivers flowing toward us from every point are concentrated below us. We are in the centre of a vast basin, whose rim extending behind us, to the summits of the Alleghanies, and on the right to the Lakes of the North, hides its rocky margin a thousand leagues before us in the clouds, and stretches far to the South toward the Gulf of Mexico.

We would fain separate, and trace back to their sources the elements of this immeasurable aggregate of rivulets. Its eastern fountains behind us are gurgling in the dairies and mountain springs of New York and Pennsylvania, and along the forest covered declivities of the Alleghanies, to the Carolinas. Its western tributaries are tumbling in a million of waterfalls from the broad slope of the Rocky mountains, the Moose deer is listening to its eternal cataracts in the fir tree forests of the far north, the Buffalo is drinking from its broad prairie-wandering branches of the west; let us trace back this mighty father of rivers to its countless streamlets, and observe them all busy in their

pauseless course downward toward the ocean; everywhere on its remotest streams the canoe of the red man is still plying and his whoop echoes at intervals in the silent forests, thousands of lovely islands are sleeping in the sunset light on its bosom, on its eastern margins are scattered the cities and village spires of the Anglo Saxons, and snorting steamers, richly freighted, are climbing with a powerful leverage the descending course of its accumulated waters.

Let us follow up its furthest sources, in all their windings, for a thousand leagues, in the silence of the forest ravines, or the interminable prairie, till beyond, in the widening perspective, the bristling mountains lift themselves to the regions of eternal snow, and the dark Lake of the Cedars drinks its crystal tribute from the glaciers of the furthest Missouri; all destined, by months of diligent and tireless meandering, to the distant delta, where the lazy alligator is lounging in the stagnant bayous, and the turbid river-gulf curdles amid the blue waves of the Atlantic.

Can you embrace the territories of this mighty river, recognize its vast extent, and trace out its extremest margin-line? whence from many a dividing summit, portions of the same snow-drift have already mingled by the Susquehanna and the St. Lawrence, with the Atlantic, or have swelled the freshets of the Oregon against the surges of the Pacific ocean.

The waters of Missouri, as you may notice, are turbid with a white or ash-colored earth, which always occurs at this season, and indicates the presence of the freshets of its upper sources. It is remarkable in the observation of the tributaries of the Mississippi, and of other rivers, that the variety of climate, and of temperature from various elevations, does much to sustain their waters during the season of Summer, when the evaporation is greatest.

The sun, with the advance of spring, melts earliest the snows of the southern parallels of latitude, and brings down in February the freshet of the Red River, tinging the volume of the Mississippi with the red colored residuum of its waters. Two or three weeks afterwards, when this has partly subsided, the sun reclaims another latitude from the frost, and then the vast flood of the Arkansas, turbid with brownish mud, becomes the easily distinguishable and predominant mass of the mighty river. Subsequently, about the middle of March, the certain progress of the season liquifies the snows of another range of latitude, and the freshets of the Ohio and the La Platte, muddy with yellowish earth of various shades, reach the Mississippi and replenish its waters. To these gradually succeed the waters of other and more Northern tributaries, till in May the flood of the upper Mississippi arrives, bearing an uprooted forest on its surges, and tinging with blue earth the lower pilgrimage of the waters.

During all this period, the Northern and more elevated sources of the Missouri remain locked in thick-ribbed ice, and contribute a cold and limpid current to the cloudy waves of the Mississippi; but about the middle of May, the snows of the furthest and most elevated sources of the Missouri, yield to the vernal sun, and commencing their long pilgrimage of four thousand five hundred miles to the ocean, reach the Mississippi in June and July, color its waters with the whitish nitrous earth with which you may now observe its current is loaded, and sustain, during midsummer, the flow of the waters when the innumerable springs of its lower valley are most diminished by intense evaporation.

This gradual release of the streams from their icy fetters is a beautiful instance of the design of supreme wisdom. If the sun acted on the whole basin with simultaneous power, one immense, all-destructive deluge would overwhelm the

valley, and when it passed would leave the river in comparative insignificance. As it is, the rise of the waters sometimes threatens destruction, but the laws of Nature limit its proud volume. The vast annual overflowings, constituted as they are of the successive irrigation of its different tributaries, are marked by corresponding successive deposits of red, of brown, of yellow, of blue, and of ash colored mould, on the shores and levels of the Delta, and the whole alluvion of the river presents, when dug for many feet, the same curious record of the subsidings of the freshets of ages.

This nitrous impregnation of the Mississippi during Summer, from the furthest sources of the Missouri, is of immense importance to the salubrity of its waters. The hardy boatmen drink its muddy sweetness in copious libations with delight; the traveller, half sick from unwholesome waters, and a thousand privations, thanks the All-provident Creator when he reaches the river, and imbibes with its waters cheerfulness and health.

But I must recall you from hydrography, which is but one of a thousand studies in a view of our Earth, to the more immediate observation of the scene beneath us.

We have now before us the region of those great mineral deposits, which nature has allotted to the centre of the immense valley of the Mississippi, or to speak more geologically, the perpetual abrasion of the descending waters wearing deep into the older underlying formations of the central continent, has here disencumbered from its superincumbent strata one of the richest mineral districts of the globe, and which, admirably situated in the concentrated ramifications of steam navigation, is destined to supply, during unknown ages, the future immense population of this mighty continent.

Those peaks you notice on our left, are of magnetic iron of excellent quality, and in quantity forming entire mountain ranges.

The white masses you see projecting on the brow of the hills, and scattered beneath us, are of white quartz, the *mineral blossom* of the Lead miners.

Yonder! on the right of the forest, is one of the lead-mining villages. Observe the miners at their work. The lead ore appears very pure and beautiful.

We pass the windings of the vast and turbid Missouri, with its picturesque bluffs, where the vulture and the eagle nestle, and below us, for hundreds of leagues, are rapidly sweeping the broad, far watered prairies of the La Platte, mingling like the solitudes of ocean with the distant horizon; only varied at intervals by a few solitary oak-trees on the hills, and by groves of cottonwood and willow, which skirt the margins of the streams.

Observe! beneath yon bright cloud in the distance, that dark line which stretches along the horizon! 'Tis the buffalo in vast herds. See! on the left they still seem to touch the blue of the furthest sky. What innumerable herds. What tumultuous masses. How rapidly they rush onward. You may hear the thundering of ten thousand hoofs. How fierce they seem. Yet all this running is for mere sport.

The buffalos are passed, and the broad, silent, solitary prairie is again fleeting beneath us. How splendid those sunset clouds are, just at this moment. Look, on your right are buffalos again. An immense herd at rest; they are ruminating as quietly as oxen.

Do you notice that drove of white animals? They are white wolves. They accompany the herds of buffalo in a playful and friendly way, until a buffalo, weaker than the rest, has the misfortune to become mired in crossing a stream or a morass, or in any manner falls behind the herd, when they attack and devour him.

It is estimated that the herds of buffalo are at present fifteen millions, and that they are accompanied by one and a half millions of wolves.

How the scene sweeps on! it confounds all conception of distance. Those must be a herd of antelopes yonder. How beautiful they are! That herd before us, beyond the river, appear to be horses. They are a splendid herd of wild horses, descended doubtless from horses of Asiatic or European origin, which have run wild from the early Spanish colonists; satisfied with feeding, they are calmly gazing at the setting sun, or lying down amid the luxuriant verdure.

You must be constantly on the alert to notice every thing, and especially the villages and scattered encampments of the Aborigines, the athletic sports and dances, the loves and parental affections of the wandering nations, their feats of horsemanship, of archery and of war. We have around us the range of the powerful bands of the Pawnees.

Observe yonder, far before us, a mounted huntsman is dashing on a herd of buffalo. The sweeping flight of the herd rushes over the hills—they are coming right towards us. He has singled out one from the herd—his bow is already bent—the victim falters behind his fellows, staggers, and falls. The hunter rejoices; his lodge is one of that cluster of brown spots you may notice yonder, a league south of us on the prairie.

He will arrive there an hour hence, laden with abundance. He will bless the moon as she shines on him. He is happy. He possesses all that he has learned to want.

The landscapes now sweeping beneath us are those of the thousand streams of the La Platte—

Where oft the beaver with mechanic art
Delays the current of his native brook,
To form a play pond for his happy young,
A little lake in mountain scenes embraced,
Where seldom e'en the vagrant hunter strolls
And Nature glories in her primal bloom.

It would be admirable to see these interesting animals at full work by moonlight. You might devote some night to observe them, as well as the habits of all the carnivorous

and night wandering animals, the dances of the Pawnees, and the spectacle of fire on the prairies.

Look at those otters on the bank yonder : how playfully they slide and tumble into the water. There, must be the hut of a trapper, probably deserted since last winter. Those black clumps you notice in the summits of the blasted-topped cottonwood trees by the river are the nests of the vulture or of the eagle.

The one before us will pass directly beneath our feet, we will examine it attentively ; you must, however, avoid the attacks of the old eagle.

What a commanding view of the bend of the river ; how tranquilly the noble bird gazes on the evening sky. See ! there are two young ones half fledged.

What an air of self complacency and comfort those vultures have. They have gorged themselves on what seems to be a buffalo's carcass, and are now taking their repose. Their felicity is doubtless complete.

What is that on the prairie ? It must be a marmot or prairie dog. Look ! there are numbers of them. They are coming out now 't is evening. How they bark. There are thousands and tens of thousands. Their burrows seem to occupy a whole horizon of prairie.

Hitherto we have been so much occupied with the landscape and its groupings that I have yet scarcely called your attention to the sunset skies before us.

Our position in relation to the sun remaining unaltered, the broad horizon of atmosphere chequered with clouds of constantly varying density is silently rolling over us—while the landscape is gliding quietly below.

This transparent curtain, illumined by the lights of the heavens in all their gorgeous, everchanging glory, preserves one continued sunset before us, corresponding to the hour of our departure, and to the actual colorings of the moment on the scenes we are surveying.

The loveliest and most vivid reflections appear in rapid and pauseless succession, and fade away toward the Eastern horizon; behind you, more numerous than those changes which the sunset skies of your whole life will present, they form a kaleidoscope of celestial magnificence, and shed the most enchanting lights and shadows over the exuberant wilderness.

I must here beg you especially to recollect the purpose for which we ascended, three hours since, and that your vivid realization of the scene depends on your own attention; all I can do is to point out, occasionally, objects of interest. The landscape is rolling beneath you, you must observe for yourselves.

If you were to follow out this method of observing the picturesque panorama of our comparatively little, yet magnificent planet, in connection with the grand fact of its every-day revolution on its axis, you would suppose yourself often on various parallels and devote a day to the contemplation of nature. If you start at the Equator, you would realize the high temperature, and observe the peculiar animal and vegetable life of the torrid zone; if you take an Arctic or Antarctic position, you would realize the extreme cold of those desolate regions; you would thus become familiar with all the localities, the natural history and inhabitants, so as in the aggregate to form one entire, continuous, comprehensive outside view of the globe we inhabit, and of its daily rotation. This idea it is the purpose of this chapter to suggest.

It will be expedient, as your perceptions of the face of nature approach to distinctness, that we begin to study and to compare the habits and characteristics of the human race—that we contemplate man, the thought-gifted animal, as he has existed during a long series of ages, and trace the ancestral and inherited characteristics of the nations.

This will more appropriately claim our especial atten-

tion, when we come to survey the homes of those nations of antiquity, whose progress in arts and arms has been commemorated by more enduring monuments indicative of high civilization, and where the early invention of letters has preserved for us some historical memorials of the vicissitudes of empires ; but the general influences of climate, of soil, of a mountainous or champaign country, of mines, and of mineral treasures on the human species—the conflicts of more civilized, with more barbarous tribes, the progress and retrogression of empire, and the mutability of human achievement, may be worthy of a momentary retrospect before the wide valley of the Mississippi has passed—with its numerous mounds of extinct nations, who have lived and hunted on its far-spread streams.

The following stanzas were written when the author was amid this scenery, and may not be irrelevant :

THE PRAIRIE.

Twilight curtain'd the far water'd plains of the west,
 The landscape grew dim to the wanderer's eye,
 All was still where the prairie-bird guarded his nest.
 The sun's path was red o'er the place of his rest,
 And the vapors that loom'd on the verge of the sky
 Were bright as the hunter's dream'd land of the blest.

The bones of the bison were bleaching around,
 The herds had lain down 'mid the wild-flowers' bloom,
 And Heaven's wide concave seem'd vacant of sound
 Save where some lone prowler's fierce howl rent the air ;
 The breath of the desert was fraught with perfume,
 And the brief fly of summer in gladness was there.

I had scaled the steep cliff o'er the eddying wave,
 Whence the love-martyr'd maid, in her beauty had leapt,
 And encamped on a spot where the fair and the brave
 In the dust of the desert all silently slept ;
 Where the Osage had dug for their chieftain a grave,
 Where their hazel-eyed matrons in madness had wept.

The still Heavens glitter'd with many a star,
 The lone dewy desert grew darker and drear,
 I shrunk 'neath my robe, for my home was afar,
 And my heart's sombre musings were blended with fear;
 Kind sleep sealed my eyes, such as wanderers know
 When the lonely are blessed with oblivion of wo.

Deep visions stole o'er me with tragic-wrought power,
 Like glad sunset groupings of years that have past,
 Restoring the magic of many an hour
 Too fleeting to tell, and too lovely to last.
 Proud races of chieftains, their loves and their rage
 On the prairie's vast outline burst bright on my eye,
 Like the song-storied glories of earth's early age,
 Like a vast pictured legend portray'd on the sky.

The season's rich dramas of bloom and of change,
 Each rife in its redolent beauty and prime,
 Gave shadow and light to the vision's wide range,
 And varied the still pauseless fleeting of time.
 The winter's hunt scenes o'er the far-drifted snow,
 The fawn's happy frolics, 'mid spring's blossoms past,
 The flower-fly's flight in the summer-sun's glow,
 And autumn's sweet songsters the lonely and lost.

The hunter's gay smiles on his fond mother's breast,
 His nurture, his gambols in life's happy morn,
 The spells of his manhood's impassion'd behest,
 The flash of his eye on his battle-steed borne.
 The victor's shrill joy, the still death of the foe,
 The feats of the brave, and the right of the strong,
 Swell'd my heart with high pulses of joy and of wo,
 But no prairie minstrel has told them in song.

Here swept o'er the wild-grass the whirlwinds of war,
 Here the vulture for ages has nourished his brood,
 On the flesh of the proud and the fearless of yore,
 'Till the cliffs of Missouri were dyed with their blood.
 And here, when the autumn-moon tranquildest gleams,
 Gave wilder enchantment to beauty's kind glance,
 The glad hunter, 'tranced in his heart's dearest dreams,
 Seem'd to reap in life's fancies the joys of romance.

'Twas morning—I woke on the wild pasture space,
 Where the vast prairie spreads in its grandeur alone;
 Around me, far peering, the turf-mounds were strown,
 Where the mighty had heap'd them a burial place,
 The lone lasting record of many a race.

The races of the aboriginal hunters have successively retired from their forest hunting grounds on the hills and valleys and rivers of the Atlantic, toward the cataract of the Great Spirit, and to the broad plains where the countless streams of the Father of Rivers gather on the mountains of the setting sun. The lauds of Metamora, of Red Jacket, of Pushmataha, belong to the pale faces. Keokuck, "the watchful fox;" Mahaska, "the white cloud;" Tecumseh, "the open door," have fallen. Kiontwogky, "the corn planter;" Anpantango, "the Big Elk;" Terrekilaaher, "the unequalled;" O-poth-ye-ho-lo, and Sequoya, and Osceola, have yielded to the insatiable white men.

Let us contemplate the lapse of time, the swift course of the seasons, of human events, of generations in connection with the scenes around us; the certain return of the buds and birds of Spring; the full verdure of Summer; the party-colored foliage of Autumn; the white snow-drifts of Winter, as they have alternated for countless and unrecorded ages, upon central North America. Let us call up from oblivion the long line of generations of men, as they have succeeded each other in certain accordance with the course of ages, the frolic and prattle of the infant savage, his youthful sports, the deep passions and enduring energy of manhood, the thoughtfulness of experience, the repose of the grave, as they have passed over long series of generations; the utmost strength and prowess, the most enchanting beauty, deep affections, filial, conjugal, parental, insatiable ambition, indomitable courage, as they have flourished beneath the vast pavilion of the primal forests; or have ex-

ulted in the glad light of Heaven, like the wild flower in the boundless breeze of the prairie, and have passed away—nothing, save a few dim and unsatisfactory traditions remaining.

If you will thus trace back the events of the last three centuries, you will restore to the American continents their original scenery, before the voyages of Columbus; and may study the primeval differences, and entire comparative natural history, which the Creator has impressed on the whole face of the two Hemispheres. Their races of men, distinct in condition, civilization, characteristics; separated by the yet-un navigated Atlantic—Mexico unconquered—Africa unenslaved.

The wandering tribes of red men, whose home is beneath us, we are accustomed to call savage and barbarous; it is, however, true that in some of the nobler traits of human nature: bravery and endurance, constancy and courage, and rational ideas of divinity; they may be asserted to have equalled or excelled the original nations of the Eastern continent.

The native American “sees God in clouds, and hears him in the wind.” He worships the Great Spirit and communes with him in his loneliest moments; he has benevolently attributed to the beasts of the forest, a sort of demi-brotherhood, and believes that his translation after death, to a region of tranquil exuberance, and unearthly felicity, will be shared by the rudest animals of the chase, and that especially “his faithful dog will bear him company.” But the Native American has not degraded himself, by deifying the brute; and while the older nations of the East worshipped all sorts of idols, the “likeness of every thing that creepeth under Heaven,” he has exempted his crude and indistinct perceptions of Deity from such gross and disgusting delusions.

To the accidental discovery of the metals, and their

uses, with the consequent arts, is probably to be attributed the more rapid progress in civilization, which the Eastern continent has achieved; the evidences of combined effort, the monuments which they have left to posterity, though built of more enduring materials, granite, porphyry, and marble, appear to have been for very analogous objects, security from inundation, and burial places; (for the feeling which prompts to some feeble effort at giving reminiscence to the spot of his mortal resting-place, seems to be universal with the entire race of man, wherever dwelling,) along the valleys and on the prominent bluffs of the tributaries of the Mississippi, the rude stone, and earth heaped mounds of sepulture are very frequent, and are chiefly attributed to ancient and extinct races of the aborigines.

The unwritten languages of the natives of America have assured no records of their early history, other than a few faint traditions. The structure of these languages possesses the same evidence of progressive combinations of the simplest ideas, which are the natural origin of primitive language, and such wrecks of them as will be preserved will afford constant interest to future philologists, when, as appears to be the destiny of the future at the end of one or two centuries, the ploughshare shall have obliterated the only frail memorials which now indicate the existence of the ancient nations of the American continent.

But I have too long diverted your attention from the passing scene.

Those remotest cloud-like outlines you may now begin to distinguish in the horizon, are the-snow capped summits of the Rocky Mountains, over which the splendid light of the evening falls with delightful effect, on the long intervening leagues of forest, intersected by ravines and washed by cascades.

The myriad plants of unknown beauty—the treasures of the mountain strata—the amazing developments of the

geological eras—the countless tenants which inhabit the plains, the forests and the mountains—which sport in the brooks and flutter over the flowers—are *inconceivable*. But you must not stop to examine them with the interest of a naturalist; you cannot expect to embrace every thing in a day. You must observe, therefore, comprehensively and with promptness. The grand study of our present survey is *Generalization*.

The higher mountains are rapidly approaching—we must ascend.

We have now below us the westernmost fountains of the Missouri, and the summits of the Rocky Mountains. We have filled with living groupings, with sketches of actual life, the whole scenery; and have attributed the thousands of streamlets to their respective rivers, and observed the forests and fields, the plains and ravines and mountains, each rife with all its appropriate inhabitants. We chose, you know, for our excursion, the season of harvest and the hour of sunset, and have witnessed a sunset landscape of a thousand leagues, with all the actual imagery as existing at the passing moment.

The summits passing below us, are the “cloud-capped hills,” beyond which the wandering tribes of Missouri picture the land of the blest, the “humbler heaven” of their future hopes—

“Lo the poor Indian, whose untutored mind
Sees God in clouds, or hears him in the wind,
His soul proud science never taught to stray,
Far as the solar walk, or milky way,
Yet simple Nature to his hope has given,
Beyond the cloud-capp'd hill, an humbler Heaven.”

We are on the fortieth degree of North latitude. The vast ranges of mountains beneath us merit especial observation; they extend northwardly to the unexplored Arctic; let your mind's eye for a moment trace them thither. And

now, turn your eye Southward, and trace them by the mountains of Mexico and of Darien. Observe where their eternal snows glisten in long perspective across the Torrid Zones, till Chimborazo rises in the lengthening line, and further still to the Southern extremity of the Western continents.

The Mountains are passed. Beyond them the vast horizon bursts upon us. the streamlets now beneath us are the southernmost tributaries of the Columbia.

It was here, a few short years since, that the intrepid companions of Capt. Merriwether Lewis hailed the rivers flowing to the Western Ocean, and looked down upon the far-spread home of savage nations, untrodden by the footsteps of an European.

“His was the peril, glory, pride,
First of his country to explore
Whence vast Missouri’s currents glide,
Where white man never trod before.

“These roaring cataracts he scaled,
These mountains of eternal snow;
Here his brave band the rivers hailed
That westward to the ocean flow.

“Subdued by boldness, and amazed
At daring deeds unknown before,
The hordes of Indian warriors gazed,
And loved them for the hearts they bore.”

The mountain wilderness of enormous fir-trees, which shades the southernmost tributaries of the Columbia, is sweeping silently in the evening sun-light beneath us. Do you notice how different the forest appears? it is composed of entirely different species from those of the valleys of the Susquehanna and Mississippi; the oaks and hickories and walnuts, the buttonwood, the liriodendron, and the maples have disappeared. You may notice several species of birch and ash, and one species of dog-wood, but the predominating genera are the resinous trees, and the most

majestic species of the firs are widely multiplied in these regions.

Let us occasionally descend beneath the shade, and observe in their native haunts the habits of the peculiar wild animals of these central solitudes.

Primeval stillness reigns, interrupted only by the breeze gently swelling in the old forest, or the leap of some fountain cataract, playfully commencing its pilgrimage to the distant ocean.

Hark, that rustling! Yonder he is, a noble elk, browsing. Look, look at that panther, there in the tree. Ah! he has pounced down on the elk.

The stricken victim dashes through the forest, with the energy of despair; he throws back his branching antlers, the panther retains his hold, his carnivorous teeth have already opened the streams of life. The elk has fallen.

Here the brown wolf prowls at midnight, glutting his thirst for blood on the sheep of the mountains. Here, too, the fierce grisly bear exacts his tribute of blood: within his rude gripe, the timid deer bleats, and the proud horse struggles in vain.

Yonder, beyond the ravine before us on the verge of that precipitous, inaccessible bluff, a ring-tailed eagle, the fiercest of the American falcons, is alighting on his nest. The parti-colored plumes of this bird are highly-valued, and form, as you may recollect, the crests of the chieftains of the plains of Missouri. The red men on both sides of the mountains have an idea that the qualities of noble animals are imparted to the wearer of their spoils; and their barbarian warriors, like those of old Greece, pride themselves in wearing the skins of the fiercest animals.

The country before us is now becoming more level, and intersected by broad and fertile glades, traversed by the larger tributaries of the Columbia, tumbling in gentle rapids or flowing with glassy stillness, amid sweet wooded islands.

What is that Indian doing? He is fishing. Look! he has just caught a large fish. It is a salmon. What very various costumes the Indians have! they appear to be fashioned in countless modes from every skin and every feather of the forest.

The lodges of the red-men are more numerous. Yonder is the largest village we have passed this side the Rocky mountains. We seem to be approaching prairies again; the vast plains of Columbia are before us, green in the fullest verdure and teeming with thousands of herds of buffaloes, of antelopes, and of horses; 't is the range of the Shoshone Indians. Will you notice this tribe especially, they are numerous, powerful, and unsurpassed in horsemanship, in classic figures and indomitable courage, by those cavaliers of ancient Numidia, who followed, twenty centuries since, the hero of Carthage to the gates of Rome.

The Tartar Asiatic origin of the American tribes has been contended for, by able students of nature, and has certainly considerable corroboration in the analogy of their organization.

What are those dark groups yonder, on the distant prairie? They are bands of horsemen. Hark! 'T is the war whoop! Bands of archers, mounted on the wild steeds of the desert, are charging in irregular combat. 'T is a fierce and deadly battle. The storm of horrid war sweeps on, and we have again the silent and boundless prairie.

Do you notice that cloud-like line in the West? 'T is another range of mountains. The grassy horizon of the plain, with its herds of elk and antelope, has passed, and you again trace the fountains of the Columbia, and its far-winding tributaries, amid a thousand landscapes of undulating and mountainous forest.

Do you hear the roaring! We are approaching the great cataract of the Columbia. What a sublime landscape! Observe it attentively. The fall must be more than double

that of Niagara. Look at those bald eagles, they are always partial to the vicinity of cataracts.

The scene rolls on. Fir trees, an hundred yards in height, cover the hills with deep verdure; vast amphitheatres of unknown foliage, occasionally diversified by grassy glades, spread in luxuriant beauty over the valleys; the waters of the Columbia, for hundreds of miles, are alternately struggling beneath us for long reaches in narrow ravines, where the streams empty themselves in cascades from the hills, tumbling in foaming rapids over its rock-obstructed channels, or flowing with gentle current, where the hills recede to the horizon, and give place to wide and fertile intervals.

Those animals you now occasionally notice, amid the rocks of the river, are the sea otters, whose rich furs form a valuable object of commerce, and purchase for the natives the utensils and the trinkets of the white men.

The otters are appearing in great numbers. We are approaching the last great rapids, at the foot of which the descending waters meet the tides of the Pacific.

The wild scenery of the rapids is past. We have now beneath us the widening delta of the Columbia. Clouds of ephemera are commencing their flight from the tranquil waters; the groups of red-men are enjoying their evening meal, and pursuing their various employments on the shores, or paddling their bark canoes to songs of harmonious cadence, amid rich meadows, and wooded islands, fertile by the reflux of the Pacific Ocean. The geese, swans, gulls and other water-fowl, are squalling on the shores and sand banks; the breakers are roaring at the foot of the distant bluffs.

We will pause for a moment, where the mountain before us obtrudes its lofty and precipitous height into the sea. Immediately in front is the ocean, which breaks far below at our feet, and on either hand, as far as the eye can

reach, against the bluffs and irregular piles of rock, which diversify the shore ; on the right is the sheltered estuary of the Columbia, widening into bays and islands, studded on both sides with the little reed-thatched villages of the red-men. Behind us is a rich scene of forest and prairie ; before us the immensity of ocean, empurpled by the setting sun. Do you see there a ship, I presume a fur trader, at anchor in the offing ? on your right another sail is visible in the distance.

The receding shores of Western America are now fast fading behind us ; for six successive hours, more than a fourth of the Earth's circumference, two thousand leagues of billowy boundlessness, will sweep beneath us. Let us embrace the occasion to observe such of the atmospheric phenomena of the ocean as the range affords.

Before us, the incessant and ever varying glory of the sunset sky is mingling with the horizon of the ocean. A summer shower is approaching ; let us ascend above the clouds, and hear the thunder rolling in the sunlit masses below us, "O'er the wide waters of the dark blue sea."

In this vast tract of ocean, rolling in one broad expanse from amid the beautiful palm-tree islands of the sunny Tropics, to where on either side it is eternally dashing on the ice-cliffs of the Arctic and Antarctic, what an amazing variety of fishes and shell fishes have their home.

The following stanzas are an attempt to illustrate the residents of the bed of the ocean :

THE SONG OF THE SEA SHELLS.

Where the water plants bloom in the fathomless ocean,
O'er regions more wide than the verdure of earth,
Deep down 'neath the broad waves' far-heaving commotion,
Kind nature allotted the scenes of our birth.

Where'er the blue billow in boundlessness rolls,
Or the moon-lifted tide-swell is pauselessly piling,

From the Icebergs that gleam on the star-lighted poles,
 To the glad Isles of Atlas, perennially smiling,
 'Neath the path of the Sun ; where the coral-rock grows,
 And the last weary surge of the tradewinds repose ;
 There our tribes are all dwelling in gladness and pride
 Mid the pastures of ocean, untraversed and wide,
 In numbers computeless, and colors that vie,
 With the blossoms of earth, and the lights of the sky.

Where the frost-night of winter encrystals the wave,
 Where the blazing sun sinks 'mid the flush'd ocean's smiles,
 Where the grampus or dolphin have found them a grave
 Neath the poles' cloudy cliffs, or the palm-shaded isles ;
 Where the pearls of the Orient, in loveliness sleep,
 And earth's richest treasures and men's bleaching bones
 Are scattered abroad on the plains of the deep,
 Neglected, unprized as the beach-weather'd stones,
 Where the brass-sculptured galleys the Argonauts bore,
 Still curve their bold prows half interr'd in the sand ;
 The fleets which have sunk 'neath Charybdis' roar,
 And the time wasted wreck-ribs of every shore,
 Which ocean's old rovers have left on the strand ;
 There our kindred are sporting in joy and in pride,
 O'er the pastures of Ocean, so fertile and wide,
 In numbers computeless, and colors that vie
 With the gems of the earth, and the lights of the sky.

Where the canvas of commerce has courted the breeze,
 And gallant ships, gay as the clouds of the hour,
 Have swept o'er the mountain-wave-waste of the seas,
 While traffic-built cities grew peerless in power—
 Where the fleets of dead empires have crowded the wave,
 And navies have reel'd to the cannon's deep roar,
 To swell in proud annals the fame of the brave,
 On the archives of ages, whose glories are o'er—
 Where the nautilus lifts his light sail to the breeze,
 Where the mariner sings to the sky-circled wave,
 By the rock shelter'd inlets and isles of the seas,
 Where the far fabled syrens enchanted the brave—
 There our tribes are all dwelling in gladness and pride
 'Mid the pastures of ocean, so fertile and wide,
 In numbers computeless, and colors that vie
 With the blossoms of earth, and the lights of the sky.

Where'er the wide azure its barriers laves,
 Where the surf of the summer breeze playfully roars,
 Or the far heaving surge of the storm-fretted waves
 Rifts up ocean's relics on earth's furthest shores—
 There, while glad sun light fades o'er the ocean's white foam,
 And the cool breeze of evening blows fresh on the strand,
 The blithe sea boy, sadd'ning in thought of his home,
 Is gath'ring gay shells from the billowy sand,
 While he grieves the hard fate which has doom'd him to roam,
 And visits, in visions, his love-lighted land—

He shall bear them away from the scenes of our birth,
 And bright eyes shall value his far-gather'd shells,
 They shall haply be group'd o'er some bright glowing hearth,
 Where affection has woven her home-nurtur'd spells,
 Where kindness still welcomes the wand'rer of earth,
 And his heart's fondest day-dream of happiness dwells.

Look at those flying-fishes! a shark is after them. They fly out of the water to get out of his way, but they cannot fly very far, and the shark will probably make a supper of some of them.

Look yonder, it must be a whale spouting. See, there are others. What is that on the horizon? It is a sail, a ship. Look, there are more whales, the boats are after one of them. See, they are going to strike a harpoon into him. Down he dives. He has come up close by us. He spouts blood. They will get him and bring his oil home.

These hardy navigators are chiefly natives of the United States. Sailing from a barren sand-shoal island of ocean, and a rocky inlet of the Western Atlantic, their canvas whitens the oceans of both hemispheres, and pursues the various species of whales in their respective haunts, from the icebergs of Greenland, to the Straits of Behring, and amid the countless islands of the Southern Ocean.

Let us assume a high elevation, and while the gently roll-

ing billows of the broad Pacific are rapidly fleeting in the evening light below us, ere we approach the shores of Asia, I wish again to command your attention to our motto, *generalization*, and to call your attention to the splendid and glorious reflection of the sunlit skies, which are at this moment shedding such magnificent light and shadows on the empurpled ocean.

You will also notice the China trading ships, and find, among the navigators of the Pacific, your own townsmen and friends, who, though they will consider ours a visit unrivalled in naval annals, will be not the less gratified to see any one so lately from their far-distant home.

Do you notice that dark line which bases the sunset glory of the Western horizon? It must be land! Is it possible that two thousand leagues of ocean scenery have swept under us so soon? 'Tis land, certainly. It must be the Japan Islands. It is the shore of Cape Nambu, in the Isle of Nippon.

The Isle of Nippon, its shores enlivened by boats of peculiar construction, with latteen sails, veering to the breezes, and the town of Achita, and beyond the inland scenery and landscapes robed in the characteristic vegetation of Asia, and bright in the sunset glory of the Summer solstice, sweeps for one hundred miles beneath us.

We have again an ocean horizon. It is the sea of Japan for two hundred leagues. The countless vessels of various construction you observe in these seas, are the coasting commerce of China. We are approaching the shores of the Celestial Empire, the most populous of nations.

Do you notice that black cloud on your right? It must be a typhoon or hurricane, of which you have read, as occurring on this coast. Where shall we meet it?

Above the cloud, or down near the ocean? See how the boats and vessels are furling and clewing up sail. It will be on them in a moment. Look how dark it is under the

cloud. Here it comes. That boat is capsized. Look at that ship how she heels to it. Do not tell me to look, I cannot see any thing. However, we'll soon be through it. What a dreadful squall. Let us rise above the cloud and look down on it. How awfully it thunders. It is leaving us. It passes on like a whirlwind.

'Tis past. How bright the evening sun shines on the relics of the storm, and the sad destruction it has caused. Thus, days and years progress. Time pauses not over the fate of individuals.

The land you may now begin to distinguish in the horizon, is the Isthmus of Corea. The Peninsula sweeps beneath us in broad perspective, the town of Tchang-chow, and two hundred miles of landscapes, bringing us to Kirin the most southern province of Tartary.

The ocean scene, sweeping in the distance on our Southern horizon, is the head of the Yellow Sea, or Whang Hai, in the language of the natives; the breakers are roaring on the coast of Tartary; below us is the hilly and woody promontory, from which Peking obtains much of its timber; before us is sunset on the Gulf of Leaotong.

As the continent of Asia approaches, we will for a moment ascend to a great elevation in order to view its widest topographical characteristics.

We are on the fortieth parallel. The coast of China, extending South through nearly twenty degrees of latitude, presents a vast breadth, populous with coasting vessels and green in Summer verdure.

China is in extent one third larger than the United States east of the Mississippi, and the Chinese empire, extending through the extreme breadth of Tartary, surpasses in extent the entire territories of our country. It comprises one-fourth of the soil of the Temperate Zones, and some of the finest rivers and largest cities of the earth, and contains

three hundred and fifty millions of people, who have lived for thousands of years under stable political institutions.

But little, comparatively, is known of this immense and swarming hive, as the internal regulations of the empire till lately prohibited intercourse with foreigners, except under strict surveillance, and for purposes of trade, at a single port, Canton, which is a city of a million of inhabitants, eighty-four thousand dwelling in boats, on the river Hoogly.

Its inhabitants call it the Celestial Empire, and boast for its archives unrivalled antiquity, not yielding in national self-importance to the smaller but more ambitious and quarrelsome nations, who have figured in the eventful history of the European side of the continent.

Almost below us, stretching with its windings to the West, is the Great Wall of China, which may be said to separate two people. On the right, extending far into the Northern parallels, you will notice vast tracts of pasturage, and the herds and flocks of the Manchow Tartars, who are almost exclusively a pastoral people; while on the South extend tracts of landscape, imbedded with the garden cultured fields of the Chinese, who are, as exclusively, tillers of the Earth.

You may notice that the climate and some of the cultivated productions of Eastern Asia are not in all respects unlike those of similar latitudes in our own United States.

The famous wild plant ginseng, to which the Chinese attribute wonderful properties, and which is gathered as an exclusive monopoly for the Emperor, grows in the province of Kirin, in Manchow Tartary, in similar latitudes and mountainous situations, to those in which it is found in the interior of Pennsylvania, and from whence it is sent round the half circuit of the globe to China, as an article of commerce.

In the United States, the grasses are indigenous on the

fortieth parallel, and north of it. These are the latitudes where the horse, the ox, and the sheep flourish. Grass is the staple of New England. A few degrees south of the fortieth, we verge upon the planting states, and grass begins to be less generally and profitably cultivated. Such is precisely the case on the Asiatic side of the planet.

The horses and cattle of the more southern parallels tend to deteriorate from the heat of the climate. Labor is there performed by the mule and the ass. "In the whole of central and southern China," says Mr. Davis, late British Chief Superintendent in that country, "there is no good land for pasturage. The cattle and horses are accordingly poor, and of stunted appearance; in no country in the world are fewer cattle used for the purposes of draft or burden. No people consume so little meat, and none live so much on fish and vegetable food. Towards Peking, the case is somewhat altered." This is obviously because you there find the proper latitudes of the horse, the ox, and of their appropriate food, the grasses.

Oats, in all parts of the earth the most northern of grains, is grown in Tartary, as well as in Siberia, Scotland and the Canadas.

Wheat is also grown in its proper latitudes in Eastern Asia. In China millet seems to substitute food to those latitudes in which Indian corn is a staple on the American continent. Those more southern parallels which in our own country are respectively suitable to the culture of tobacco, rice, cotton and sugar-cane, are in China devoted to tobacco, the castor oil plant, the mulberry and silk culture, extensively to the tea plant, tea being almost universally drank in China, and largely to rice, which forms the chief food of Southern Asia—and also largely to cotton and sugar.

To the north the apple and the pear tree flourish, the grape grows in the central provinces, towards the south the

yellow and the crimson orange. On the uncultured portions of the hills grows the camphor tree and the downy myrtle. The shrub you may notice on the hills now so fragrant and white with a profusion of blossoms, is the *camelia oleifera*, the seed of which furnishes the favorite vegetable oil of the Chinese.

The coast of China in this latitude is flat and alluvial, and intersected by large rivers and canals which traverse the extensive valleys and level lands where the rivers are banked out by dykes. Over large districts careful irrigation forms a part of the system of culture, by which they contrive to render the soil more productive than the best cultivated acres of Europe, and much of the land is subject, like those of Holland, Egypt and Louisiana, to destructive inundations when the floods of the rivers overflow the embankments.

The town of Yong Ping passes somewhat south of us. Some leagues to the south you may now observe Teen-tsin, a city of 700,000 inhabitants; it is situated on the Peiho river at the point of intersection of the canal, the capital and the ocean. It is the seaport of the capital. It must be a place of much business. At a distance it has the appearance of a large European seaport. Those white masses you see piled in the neighborhood are of salt, which is largely manufactured on the marshy borders of the sea adjacent, and whence it is distributed for the consumption of the capital and the empire.

Below us is gliding one of the most fertile and carefully tilled regions of earth. Let us descend. Do you notice those large flowers growing in the shallow lakes and by the sides of the canal? Pick one. They are very fragrant. Do you not know it? You might have seen them growing in some of the ditches a mile or two south of Philadelphia, where they have been naturalized. It is the *nelumbium* or lotus, the seed or nuts of which they use for food.

In the more southern provinces of China they raise two crops of rice during the Spring and Autumn, and a crop of *petsae* similar to our cabbage, and other vegetables during the Winter.

The country here is a level alluvial plain with but few trees. You may notice the weeping willow and the elm. What is that fine tree yonder? It seems to be a species of ash.

Look around, what a splendid scene of cultivation! The country looks like a continuous garden, scattered with the huts of the peasants. Scarcely any roads, fences, or hedges are to be seen. As there are few cattle and wheel carriages in the country, the fields are separated by narrow foot-paths, and by ditches and banks.

The labor in other countries done by horses, is here mostly done by men, and you notice also many women at work in the fields. That is a venerable looking old peasant. I should like to converse with him. These people are the countrymen of the learned and philanthropic Confucius.

That is a beautiful garden. What large splendid flowers are those! They must be piones: they are here indigenous. If you were three months later in the year you would see forty varieties of China Asters. China, bright with its rolling curtain of sunset skies, the present fragrance of Summer, and the evening songs of summer birds, is below you. You must observe with attention, or amid the many groups of new objects much will escape you unnoticed.

Its hundreds of millions of acres minutely divided and under the most careful culture, its indigenous vegetation, its men and women peasants, its villages, its artisans, the establishment of its peculiar manufactures, which although in some respects inferior to those of Europe, are in others unsurpassed in the world. The Chinese were the first inventors of gunpowder, of the magnetic compass, and the art of

printing, all of which have been improved upon in Europe.

What is that in the horizon? Holloa, boy, what is that yonder? 'Tis Peking. Ah, we are approaching Peking, the largest city in the world. Let us rise somewhat, we can here see only the wall. It will pass directly under us. It contains two millions of people. You will have a fine opportunity of seeing the characters, costumes and institutions of the citizens.

The southern portion on the left is the Chinese part of the city, which is the most populous and elegant, though the northern portion, or Tartar city, comprises the palace of the emperor.

Observe the wall. It is of blue brick, castellated and flanked with bastions. It is thirty feet high and twelve miles in circumference.

Do you observe the roofs of its public buildings, covered with yellow varnished tiles, which, fluted in gentle curves and variously embellished, glitter like gold in the setting sun?

Immense magazines of rice, and the Altar of the Sun, characterize the north-eastern angle of the city. That building on the south of the rice magazines is the Astronomical Observatory of Kinsing, or the Planet Venus. That high building you notice on the north is the Choong Low, or Bell Tower, near to which is the office of the General of the Nine Gates, or Head of the Police. South of this the enclosure you notice, occupying nearly the centre of the city, is the Imperial Wall or Citadel. It is an area of about two square miles, and contains the emperor's palace, with its splendid artificial hills, lakes, parks, pleasure grounds and gardens.

Do you observe the broad regular streets—what throngs of people crowd the principal thoroughfares—the front rooms on the principal streets are splendid shops. What is

that procession all in white costume? 'Tis a funeral of a high officer or mandarin. What is that they have in those baskets? 'Tis ice, certainly; they use ice and coal here as well as on our side. There is another procession; you notice that the costumes are all gay colors and that no one is in white. This is a bridal. These people are very good looking and seem in fine spirits. They are natives of a favored latitude. What a lovely summer evening. What a vast hive. The people seem all in the streets. The citadel or central city is below. Observe the military costumes of the guards. They are chiefly Tartars, as the emperor is descended from the Tartar conquerors of China.

Before us is the palace rich in barbaric splendor. Yonder, can that be the emperor walking in his garden? It is his Celestial Majesty himself. We will have a look at him. He seems to be rather disquieted. The English "barbarians" have justly provoked him by sending fleets of war-ships and steamers to sustain the opium smugglers.

Let us elevate ourselves, and look down on the whole area of the city. The plain on which Peking stands is an immense alluvial flat. Towards the west, you have again scenes of culture, the country becomes more hilly.

From the mountains now approaching us, they obtain great quantities of coal for the use of the capital. The mountain sides are fragrant with the white blossoms of the camelia, and numerous flowers blooming in the genial air of the Summer solstice.

We have now one hundred leagues of Chinese landscapes, well cultured plantations, and populous villages of the Celestial Empire, bringing us to the Great Wall, the north-western boundary of China. The wall passes under us and Chinese Tartary, or Mongolia, is before us. We pass the sources of the Hoang Ho, and have now for twelve hundred miles the vast Deserts of Shamo and of Sultus, where the boundless plains and steppes, the grazing range

of the ox of Asia, alternate with tracts of sand, which drink up the rivers flowing on the north from the Altai or Morsart, and on the south from the Kuenlun or Mustag Mountains, which separate Tartary from Thibet.

Vast herds of oxen, grazing upon the immense steppes, herds of antelopes, hares and sand partridges and the roving pastoral equestrian tribes of the wandering Tartars, diversify the sunset horizon.

We have now had, for twelve hours, the sunset scenery of one half circuit of the revolving globe. One hundred and eighty degrees of longitude from Philadelphia, have swept under us. It ought to be borne in mind that the Earth's circumference on the parallel of the equator, is more than twenty-five thousand miles; on the twentieth degree of North or South latitude, it is over twenty-three thousand five hundred miles; on the fortieth, nineteen thousand two hundred; on the sixtieth, twelve thousand six hundred; on the eightieth, four thousand three hundred miles, converging to a point at the Poles, or the ninetieth degree of latitude.

The pastoral villages of Kintan, Toula Kapta, and Chachow, belonging to the various families of the Mongols, the Eluths, the Kalkas, the Sharras, and the Chosotes, sweep under us.

Beyond on the left, ten degrees southward, Thibet extends to the base of the immense mountain range of the Himalaya, the northern boundary of Hindostan. You may observe, for a thousand miles, the continuous groups of summits deeply indented in the heavens; where the far-wafted exhalations of the ocean are condensed in immense glaciers, from whence tumble in torrent-cleft gorges, the cataracts of the Berhampooter, the Ganges, and the Indus, the noblest rivers of Hindostan. In these mountain ravines you may trace the records of those wondrous geological

revolutions, which have chronicled the duration of the Planet.

Beneath us are the table lands of Thibet, before us the mountains of Betur Tag; beyond, Bucharia and Turkistan, provinces of Tartary, sweep for a thousand miles of landscapes, deserts and cultured fields, the home of the robber, and the cottage of the herdsman. On the south are fleeting the flower gardens of Persia, beautiful with rosebuds and nightingales and love-dreaming maidens, and the spice groves of Araby the blest.

On the north is the range of the wandering Tartars, the Cossacks of the Don, the Volga and the Dneiper, the provincial empire of the Russian autocrat.

The broad, smooth horizon, where the sunset's glorious variations are now so enchanting, is the Caspian Sea. Its shores are already approaching and we have again an horizon boundless as the ocean—

“The sea, the sea, the open sea.”

The boundless billows are again on every side around us. The various construction, materials, and modes of navigating vessels on the oceans of the Earth, are subjects worthy of your notice, from their utility and picturesque interest.

You can now recognize the western shores of the Caspian. Before us is Georgia and the Circassian mountains, the birth-place of the noblest variety of the human species. You will, perhaps, hereafter be able to satisfy yourself on the much discussed question, how far the varieties of men are a result of climate, local advantages, and civilization, or whether, and to what extent, original differences of organization have caused the very striking diversities which exist at present.

Before us are now approaching the mountains of Caucasus; their valleys and elevated plains, the nursery of a race the most fortunate in intellectual endowments, and most beautiful in physical contour, which has subjected and

colonized the whole Western Hemisphere, less probably by the warlike superiority of its characteristics, than by its superior intellectual and moral qualities. The mountain you now observe is Mount Ararat, so celebrated in the sacred history of the patriarchs, as the spot where the ark rested in the midst of the waters of the Deluge. Around us are the seats of the old empires of Asia, the earliest home of civilization.

Below us is the vale of Mount Shinar; the range of the rescued antediluvian shepherds. The rivulets beneath us, are the tributaries of the Euphrates and the Tigris; the successive scenes of the pride and greatness of the Assyrian, the Babylonian, and the Persian empires; now only recognizable in the mouldering and moss-grown ruins of their deserted cities, where the bittern dwells in solitude, in fulfilment of the predictions of the prophets.

The present cultivators you will notice frequently kneeling in their fields; it is the hour of their evening worship; they are the disciples of Ala and of Omar, devotees to the enthusiasm of the prophet Mahomet, subjects of the far-spread, but feeble and declining empire of the Ottoman Porte. Before us are the landscapes of Turkey fleeting in the sunset light, presenting in vivid reality the actual condition of her people and her institutions; the most impressive results of her history, and her characteristics.

Before us on the right is Constantinople; it is sunset on the sea of Marmora; the old groves, the islands of surpassing beauty, picturesque villages at the water's edge, convents and mosques and remnants of Egyptian, Greek and Roman architecture, and ruins of its various dynasties. In the distance Mount Olympus presents its snowy peaks and verdant acclivities sloping to the sea.

On our southern perspective are gliding the landscapes of Syria and Palestine, scattered with dilapidated cities of other ages; Antioch, and Balbec, and Palmyra, Damascus,

and Jericho, Jaffa, and Jerusalem, celebrated by the history of the Apostles of Jesus and a thousand sacred recollections. Beyond these the spice groves of Arabia the blest, the broad wave of the Mediterranean encircling the isle of Cyprus and its southern shores, Egypt, the valley of the Nile, with its cities of temples and pyramids, and obelisks and catacombs; Alexandria, Cairo, Dendera and Thebes, and the Lybian Desert, and the Oasis, and still further, where the perspective extends toward the tropic, the Mountains of Atlas, their valleys green with groves of palms and acacias, and their declivities gleaming with the glacier cataracts of the Nile.

Over the whole scene the tranquil light of the evening is falling. The mouldering relics and antiquities, and monuments of past ages, of Egypt's celebrated eras, the present various occupations of her less ambitious cotemporary inhabitants, are all before you. I will not disturb your own contemplation of such scenery by any attempts to detail the particular histories of the remarkable monuments, or to decypher with Champolion the inscriptions of antiquity. The whole area of the ancient nations during the entire lapse of time from the founders of the oldest temples to the present hour, with its patient explorers and careful decipherers of their dubious hieroglyphic inscriptions, must be assiduously studied to acquire in detail the accumulated historical recollections of the race of the Pharaohs. In the midst of this vast landscape you may observe where—

“ The white walls of Akka rise fair from the sea,
And fertile and lovely thy plains, Galilee,
Milk and honey are there, and the rose blossoms smile,
But the wild Arab lurks in the desert defile,
Where the green Mount of Olives looks far o'er the plain,
O when shall time waken its glories agnain.”

In our survey of the American continent I called your attention to the grandeur and the details of the Summer

landscape, vivid in all the mature luxuriance and brilliant variety of vegetation and animal existence; in short, to the actually existing cotemporaneous natural history of the earth in its most stupendous and most minute realities—but in realizing the history of the human animal on the theatre of the great empires of antiquity, we must necessarily introduce the idea of progressive or successive periods of time—and contemplate the lineage, character and achievements of nations, and of successive generations of men as they have actually appeared, and wrought during their little hour the humblest labors, or the proudest pageants of the human race.

[As it is an interesting reflection to consider the existing intellectual advancement and moral condition of each individual as an aggregate, accumulated result of the impressions and influences and experience of his whole life—so that from his early infancy, every one of his waking hours, as well or ill spent, adds its impress to the structure of his mind, and may modify for good or evil his future character and destinies: so it is interesting to study the causes of the transmitted character which events and master spirits have imparted to races of men, and which constitute the distinctive peculiarities of communities and of nations. The first illustrates the importance of original organization, of good instruction, and of self-discipline to the individual, as capable of rendering a man every hour progressively a more intelligent and a more perfect being: the second contemplates the importance of the good or bad qualities of the humblest individuals as influencing the race in general, and as contributing in some degree to the aggregate character and happiness of nations, and even to the entire progressive condition of *civilized man*.] We must no longer *reason* from incomplete premises, but enable ourselves to embrace in our reflections, and to make available to correct and comprehensive judgment on all questions, and on every subject,

the whole area of facts, physical, intellectual and moral, which the whole world presents.

Dr. Johnson somewhere says, that in proportion as we are able to abstract ourselves from the present, and to fix our attention on the past, the distant and the future, we elevate our intellectual and moral nature. I must ask you to do more than this; amid our vivid panoramic survey to extend your intellectual horizon until it may embrace the present and the distant, the past and the future, with all their proper relations to each other. We may thus approximate as far as the feeble, finite nature of the human intellect will allow us, to our idea of the Omnipresence and Omniscience of the Supreme Eternal Creator of all things.

Such a range of thought would redeem us from local short-sighted estimates—from partial, prejudiced, self-conceited conclusions; from most of the national antipathies, the personal piques, the political feuds, and sectarian bickerings, which characterize the intercourse and affairs of men; and teach us to cherish broad cosmopolitan views, which, recognizing all the fraternities, and all the contrasts of the human family, would embrace with wise philanthropy the welfare of mankind.

In attempting to realize the whole facts of man's nature, as he actually exists at this moment, in all countries and climates, his institutions, his feelings, his occupations, his entire condition: let us contemplate the distinctive families of men wherever dwelling—not only with a vivid and correct knowledge of their present country and their present character, but with all their transmitted, accumulated, concentrated destinies in past ages, as illumined by the lights of history. Let us trace the nations in their origin, and seek in the rude and early ages those individual and generic elements which have given peculiar character to the various races of men.

Let us watch the empire-founding animal, building his

first rude cities on the course of some mighty river, as we would watch the mechanic beaver of the mountain stream; let us carefully study the history and emigrations of the conqueror, and colonizer of the universe.

Let us, for instance, study the biography of the father of the Hebrews, the founder of a race; let us observe the patriarch Abraham, amid the scenery of his childhood; let the years roll on while we steadily contemplate his youth, his adolescence, his maturity, his old age. Let us follow the changes of his long life, with pictorial vividness, till age wastes his athletic form, and he is borne by his children to the sepulchre of his kindred.

Let us carefully follow the biography of his successors in all the varieties of character, and of destiny, which in the aggregate constitute the general history of the race; let us contemplate at our leisure, with dramatic truth and power, and with fraternal and philosophic sympathy, the prominent individuals, and the prominent eras of the Hebrew nation, in their proper succession, as parts of the great continuous procession of human destiny; in which the prattling infancy, the adolescence, the years of physical and mental vigor, the fortunes, and the fate of the most distinguished individuals shall pass before us, continuously and successively, in connection with the origin, the aggregate progress, the glories, the pageants, and the vicissitudes of nations.

Let us study, with more than cotemporary interest, the brilliant biographies of Achilles and Agamemnon, of Julius and Augustus Cæsar, of Plato and of Aristides, of Seneca and of Cicero, of Regulus and of Brutus, of Alfred and of Shakspeare, with the influences of their individual characters on the drama of their cotemporaries, on the history of their nations, and on human civilization.

Let us, in short, having already pictured a beautiful and correct panorama of the whole earth, and realized as

naturalists, with scientific accuracy, the present entire simultaneous existence of our most wonderful little planet, now superadd the idea of time. Time past and passing.

Let us observe the phenomena of its passage, the constant revolutions of the seasons, the succession of generations, the lapse of ages on the whole scene of terrestrial existence.

If you will not neglect the landscapes of the old empires, floating in a broad and vivid panorama below us, I will continue some further general reflections on the natural history of man.

NATURAL HISTORY OF MAN.

Intelligence, incomparably surpassing the utmost measure of that benignant instinct which blesses the noblest of the brutes, distinguishes the thought-gifted animal, and renders him creation's lord.

As the masterpiece of this world of wonders, the study of the nature of man is a subject worthy of the intellect of angels, and it is (superlatively) interesting to us, as the knowledge of our own race, of ourselves, and of beings with whom we are associated in a thousand relations of utility, of necessity, and of happiness.

The knowledge of mankind, is the acquaintance with the universal laws of human nature, as illustrated by the predominant passions, sentiments and achievements of men and nations, during various and progressive developments of thought and of civilization, by the traces of human intelligence, amid the dilapidated monuments of remote antiquity, by the facts of history and of human society throughout all ages, and lastly by the study of ourselves, of the operations of our own minds and the elements of our motives and an-

tipathies, under all conditions and relations of being. Civilized man is so artificial an animal, the first principles of his nature are so shrouded by the adventitious and conventional circumstances of his existence, that *his nature*, the natural history of man, is seldom comprehensively and adequately considered.

The thought-gifted animal is a being of extraordinary interest, of noble endowments. He is the greatest wonder of the wonderful world we are contemplating—

“How poor, how rich, how abject, how august,
How complicate, how wonderful is man,
How passing wonder He who made him such.”

God, who doubtless designed to create a race of beings “but little lower than the angels,” and who knew that nations without speech, nations of deaf and dumb rational animals, would not be men, did not leave man destitute of means suitable to exert and develop his highest faculties, and he has given him accordingly, in wondrous adaptation to those essential susceptibilities of reflection, which constitute thought, organs capable of articulate utterance.

This noble faculty of speech, this power by which he was to learn to intercommunicate thought with his fellows: was a means adequate to make thought manifest in all the complex grandeur of which thought is capable.

Speech is the power of expressing our feelings and antipathies by significant sounds. The result of speech we call language. The history of all language proves that it has originated and been very gradually formed from those simple sounds which are the natural expression of human wants and passions—from the *grunt* of sagacious recognition, the *laugh* of ridicule, the accents of persuasion, of joy and of affection, the *menace* of authority, the *yell* of gratified revenge, which comprise, in a few strongly marked variations, the impulses of the savage,—to these have been first and successively added the names of the few objects of

most frequent occurrence and essential interest in the lives of those hunters, shepherds, and husbandmen, who composed the yet unlettered fathers of mankind. A few of these simple words have descended from the earliest antiquity, an evidence of the common brotherhood of the nations, and over three-fourths of the globe are still spoken in the intonations of the patriarchs.

The degree of civilization, and of intellectual advancement at which any nation has arrived at any given period of its history, or at which individual men arrive in their progress from infancy to maturity of intellect, is in no mode more strongly indicated than by the comparative comprehensiveness and adaptation of their language; words are the signs of ideas, language was invented to express thought, and all its very gradual developments have originated in efforts to communicate thought, and were evidences of thought, actually present and existing in the minds of men.

As infants use no other than such language as is appropriate to their little desires and necessities, and to the dawning of intellect, and their vocabularies in after life extend in direct proportion to their experience, their acquirements and their understanding—so nations have gradually improved the language of their rude progenitors, and men and sages of succeeding generations have invented new words adequate to their respective advancements in the arts of life, and the sciences of civilization.

As no man uses the more significant, reflective and discriminating terms of his mother tongue with effect, whose mind has not in some degree embraced the thoughts which these were originally the mere effort to communicate, but of which precedent and general use has at length made them the appropriate utterance—so nations do not acquire or possess comprehensive and classic language, until they have emerged from the savage condition and ap-

proximate toward high degrees of knowledge and refinement.

The structure of all languages accordingly proves that they have originated in the wants and occupations and sentiments of rude and unlettered ages.

All the modern languages, and among them our own, emphatically borrow most of those words which indicate thought and refinement from the Greeks and Romans, for it was in those nations, in their days of glory, that high civilization first developed the immortal capabilities of language.

In all nations there is undoubtedly to be observed a coincidence and conformity of national language, with the inherent peculiarities of national character. The Frenchman continues to inherit the volatile qualities of the old Gauls, with a language most capable of expressing wit and gallantry. The Germans, as in the days of Cæsar, are a more sober and reflective race, and their language, in accordance with their character, is more devoted to expressing facts, and is more capable of the sublime, the mysterious and the grave. The languages of the North American aborigines are distinguished for their matchless descriptions of natural scenery; the peasant language of Scotland, for its expressive delineations of rural life; but the Grecian language is the most remarkable, and has been truly said to be the most beautiful illustration of the human intellect. It is the work, during many generations, of a race of men existing under the most favorable physical conditions—where a climate the most temperate and propitious under heaven, perennially fragrant with olive blossoms and vineyards, wraps in eternal spring the most fertile and delightful valleys of the universe. There, surrounded by every thing picturesque and beautiful in nature, the human race acquired its noblest developments of manly strength, and the loveliest forms of feminine beauty. There, during

thousands of years, the happy tranquillity of pastoral and patriarchal life, the deepest emotions of love, the wildest spells of ambition, the implacable conflicts, the pomp and circumstance, and chivalry of war, the rapturous devotional sentiment of a splendid and inspiring religion, exerted their alternate influences on the human intellect. There lingered the golden ages of Greece, there lived many generations of men, venerated by their cotemporaries as the godlike. There human beauty won the immortals from their abodes, and there arose, what could under no other auspices have arisen, Greek sculpture, Greek architecture, and Greek literature.

Time has indeed passed on, the vicissitudes of empire have fallen severely on those charming valleys; but the works of genius are immortal. Future ages will doubtless boast numberless improvements, but so long as Greek sculpture and Greek architecture remain unsurpassed, so long will the language of the old Greeks remain unrivalled in beauty, the noblest monument of a mighty race. Gibbon has said of the Greek language, "that it has given a soul to the objects of sense, and a body to the abstractions of philosophy."

Language has been most essentially indebted, alike for its diffusion, its permanency and its perfection, to the invention of letters.

Letters are written language; they originated in the effort to record facts by the arrangement, combination and hieroglyphic grouping of pictures, and these pictures were naturally of familiar objects. They were of familiar objects, because it is true that "we reason only from what we know." The first authors of letters were generally shepherds and herdsmen, and the pictures of an ox, a house, a camel, and a tent, were naturally their first efforts in symbolic language. And these, transmitted from Central

Asia, became amid the lapse of generations the Alpha, Beta, Gamma and Delta of the Grecians.

That the first and original records of all nations have been pictures, and that the achievement of written language and its approaches towards perfection have very gradually resulted from the extension, arrangement and composition of pictorial symbols, is clearly to be traced from the comparison and progressive character of those tablets which have remained unobliterated during untold centuries, by the granite cliffs of the Nile. It is, moreover, confirmed by the vast archives of Hindoo and Chinese antiquity.

It is worthy of remark, that similar attempts to those which may be traced to have been the origin of Eastern literature, and to which Grecian and Roman civilization were subsequently so vastly indebted, have been made to some extent by the rudest and least cultured nations in every clime and in all ages.

We might recur for illustrations, (were it not superfluous and distractive of your attention from the rapidly fleeting sunset-lighted panorama landscapes of Asia below you,) to the various historic devices of the numerous nations of the Western continents. In South America, wherever explored, they are abundant and impressive—those of Mexico are not less remarkable—and those of the northern portions of the American continent, though perhaps indicative of less civilized art, are strongly evidenced by the rude carvings on the rocky cliffs and on those giant trunks which stood a century and a half since by the rivers of the Atlantic, and which have since given place, as if by magic, to the fields and cities of Caucasian colonization; a stock which seems destined to possess the fairest portions of both hemispheres.

From the universality of their existence, oral and written language may be considered as among those acquirements, toward which the inherent faculties of man always directed themselves; yet their progress has been very gradual—it

was the inscrutable destiny of many generations to pass away their allotted hour before letters or written records existed—and thousands of years were again to intervene before the art of printing gave its present wide diffusion to literature.

The same inherent faculties of man which remained latent for one hundred generations previous to Pythagoras' discovery of the solar system—and for two hundred generations previous to the discovery of steam engines, steam-boats and locomotives,—gradually progressed to their ultimate command of language.

It is to letters that we are mainly indebted for whatever knowledge we possess of the hundreds of generations who have successively existed before us, from whom we have derived existence, and among whom the “boast of heraldry” pride themselves in tracing back for five or ten centuries the reminiscence of their sires.

It is by the use of letters, which have given to language perpetuity and perfection, that we have become capable from the moment of time we designate the present, and from our imaginary position over the site of the old empires, of contemplating, with greater or less distinctness, the history of the past, and of recognizing the identity of our own sympathies and passions with those of beings who have long preceded us in the pilgrimage of mortality—of realizing the actual condition and cotemporaneous existence, at the present moment, of all the races of men wherever dwelling—and even of anticipating the darkly shrouded destinies of the future.

Considerable advances in civilization had indeed been made before the invention of letters. Amid the desert landscapes of the old empires fleeing below us, you will frequently notice vast groups of massive and nobly sculptured ruins, which you must hereafter examine in detail. Among these are Thebes, Balbec, and Petrea, Palmyra and

Persepolis. By the waters of the Euphrates, the Tigris, and the Nile, fertile in its annual irrigations, there had been built in the earliest ages cities which grew old in grandeur ; the homes of mighty but unrecorded monarchs. But until the use of symbolic language had become arranged, and had acquired the maturity and the distinctness capable of commemorating events, clouds of impenetrable oblivion lower over the vista of antiquity ; from beneath them the pauseless tide of generations swept onward, scattered with the wreck of empires, whose glories had blazed on the long night of ages till they illumined the heavens only to sink in irretrievable darkness, like the conflagration of a lonely vessel. To those nameless forgotten monarchs and heroes, whose achievements preceded the origin of poetry and of letters, Horace has powerfully alluded in one of his best lyrics—"Vixere fortes ante Agamemnon."

Though scarcely a relic of the primeval manuscripts of the ancients has survived the conflagration of the library of the Ptolemies, and the incessant and unsparing obliterations of envious time, the structure of human language has, undoubtedly, been simultaneous with the progress of human society, and may be contemplated as an immense, venerable and magnificent monument of the human intellect. Its foundations preceded those of the pyramids ; its artificers are of every age, and of every country ; its architecture and materials are gathered from the whole universe ; vast portions of it have fallen into ruins amid the lapse of ages. It has been often rebuilt ; it has been shattered by the earthquakes of empires, and mutilated by the rage of barbarians ; still its materials are enduring, and may be viewed with untiring interest—though fallen towers and temples encumber the primeval symbols of the patriarchs, the most beautiful mosaics, and the earliest antiquities of our race.

The antiquity of language and its nature may in some respects be well illustrated by considering it as the circulat-

ing medium of the world of thought, and as characterizing in all ages the intellectual treasures of the nations.

Like the gold and silver coins which have been current for centuries, some of it has frequently been recoined in the medallic history of the empires, but it has sometimes descended from generation to generation, without change of impression, the purest suffering least from the corrosion of time ; every successive laborer in the mines of thought, whatever may have been his age or nation, may be considered to have contributed to the bulk or purity of the existing treasure. And though the aggregate in all countries has increased with their advances from barbarism to civilization, yet the oldest has often been preserved in its purity, and the wealth of the languages of the world, like its gold and silver, has tended toward the most industrious and civilized nations of the age.

Literature, like empire and wealth, has travelled westward. Central Asia is no longer, as it was five thousand years since, the repository of the world ; since then Greece, Rome and the Saracens have been in advance of the nations. Now England, France and our own republic are severally flattering themselves with cherishing the highest civilization.

As it is entirely probable that portions of those very shekels of silver which Abraham paid for the burial-field of Macpelah, have been to the present time current in the commerce of the empires—have successively paid the soldiers of Nebuchadnezzar, of Cyrus, of Alexander, of Cæsar, of Charlemagne, of Tamerlane, and of Napoleon—and having survived the ages of chivalry, and the Shylocks of an hundred generations, may now exist in the humblest household utensil—as the very spoon with which you take your bread and milk may have formed part of the wealth of all nations since the era of the patriarch shepherds—so the present language of the nations has come down to us

from a thousand sources, a result of the intellectual action of all nations, and the derivative inheritance of all ages. "The evidences of fact," says Sir Matthew Hale, "are percolated through a vast period of ages."

We have alluded to the symbolic origin of letters, and the picture hieroglyphic records and historical devices which appear to have been used almost universally by the authors of language, in the rude and early history of the nations of both hemispheres.

All language is essentially figurative; it consists, we mean to prove, almost entirely of metaphors. It is no other than a system of parables and illustrations derived from the broad and beautiful universe. Though not always obvious to common observers, the metaphorical figurative nature of language is perhaps as evident in the thousand similes in the daily discourse of ordinary men, as in the most profound and philosophic disquisitions of the most enlightened nations.

"We reason from what we know,"—we describe every thing by comparing it with some other; we are continually describing mental conditions by comparison with some well known fact in external nature; thus we say in ordinary discourse, a man is a goose, or a fox, he's an unlucky dog, or an odd fish. Green is the color of fresh and unripe vegetation in spring—and we say any thing unmatured is green—we say a deer's horns are green, not that they are green in color, but young and succulent and tender, like the **green shoots of plants.**

We say also a man is a green horn when he is inexperienced, and an easy prey to cunning and designing persons; because when a deer's horns are green he has no means of defending himself, and is obliged to yield with less resistance to his pursuers. It is also written, a "green old age," indicating the mental condition of intellectual and moral vigor in the decline of life.

In the more poetic and complete language of the Greeks and Romans, whence, as has been before observed, most of the more expressive and discriminate words of the modern nations are derived, a deliberate sentiment is a sentiment taken from the balance. A considerate sentiment is a sentiment according with the stars. To contemplate may be translated to think with heaven ; a theologist is a discourser with the gods.

The imaginative figurative character of language has been impressed upon it by those men of immortal genius to whom the world is indebted for its beauty and perfections, in common with the refinements and magnificence of civilization.

Language is the index of civilization ; Imagination is the author of language.

As no new word can originate from memory, he who is destitute of imagination originates no new words ; language is not indebted to him, neither does he make new and impressive combinations of words or ideas ; he was not born an orator or a poet ; he uses words like an automaton.

It is remarkable that the first historians, the first writers, the first legislators, were poets, and this doubtless had its origin in the nature of language and in the nature of man.

Before the origin of writing, and while the materials and progress of language were as yet very imperfect, legislators and philosophers found it not only useful but indispensable, that whatever they intended for popular interest or general circulation, should be comprised in rhyme ; the measure and harmony of numbers, the poetic, parable style of lyrics and ballads, importantly assisted recollection, and were found by Orpheus and the earliest legislators essential to effect and impressiveness on their rude and barbaric cotemporaries. They accordingly endeavored to condense, in harmonious numbers, their maxims of law and philosophy, and the responses of their oracles, as well as their songs of

eulogy and of patriotism, of love and of war; in so doing they evinced knowledge of human nature, and the incalculable effect on national character of such ballads as the *Ranz des Vaches*, the *Marseilles Hymn*, or “*Scot’s wha hae wi’ Wallace bled.*”

I make no apology for this somewhat long dissertation on the origin and nature of language, because I believe that the study of the modes of expressing and recording thought, is one of the best paths to a philosophical knowledge of the workings of the human mind and the essential differences of things.

Collateral to the study of the origin and progress of language, is the origin and gradual development of the very remarkable science of numbers; which in connection with pure geometry extends its uses, as well to the simplest transactions of common life, as to the measurement of the weight, the velocity, the courses and distances of the planets, and enables us to sound, as with a plummet, the profound immensity of unfathomable space.

The ultimate object of this essay,—of this our excursion, is to improve ourselves as general and accurate observers of universal nature, and to arrange, and classify, and expand our knowledge of all things.

In this feeble, perhaps inadequate, attempt to present beneath you the entire earth, our minds are tasked to embrace the visible ideas of the whole; and language being an arrangement of the audible signs of visible ideas, which letters have rendered permanent, the study of both are inevitably and most instructively connected.

I have thought the centre of the old continent as favorable a position as any other for such general reflections as occur to me, illustrative of the range over which I wish your own mind to exert itself, rather than to rely either in fact or manner on my cursory observations of nature.

If I may by inviting you to this aerial excursion have

taught you to *think* with increased facility and power, and to embrace a wider range of comprehended knowledge, its utmost purpose will be realized.

Language and civilization appear to be strongly characterized by the condition of the nations in those early ages, when the authors of eloquence, the poets and historians of antiquity, contemplated the world around them. The human mind boldly struggling with its original ignorance, was groping after truth amid vague conceptions of its own destiny and nature, and mingling the wildest dreams of its fancy, with the felt sublimity and benignant realities of creation.

Their ignorance of natural causes and of the real nature of the inscrutable Author of Nature's laws left great scope to the imagination of the ancients.

The tendency of the human mind to devotional feeling, to the recognition of an omnipotent agency, and the designs of a Supreme Wisdom in the phenomena of the universe, seems to have been almost an inherent and natural consequence of human intelligence.

Deity under some conception, often indeed a very obscure and unsatisfactory one, like the unknown God of the Athenians, has been reverently recognized by all nations, barbarous or civilized, from their earliest traditions. The early poets attributed immortality to their princes, deified the human passions and virtues, and described the loves, the chivalry, and the implacable hatred of their godlike heroes.

A disposition to fill the impenetrable vista of the future, is perhaps as natural a feeling as that of devotion; the consciousness of the inavertible laws of mortality, forced upon the ancients, as it forces upon us, the conviction that they were soon to follow the preceding generations. The prospect of resigning "this pleasing anxious being," for utter oblivion, is abhorrent to nature. If the human intellect is incapable of compassing the idea of eternity, it is also in-

capable of conceiving that of annihilation. The idea of a future state of existence has been extensively and aboriginally cultivated among the rudest nations. The native American believes that he shall rejoin his tribe, on better hunting grounds, and that "his faithful dog shall bear him company." The ancient Asiatics and Grecians believed they were to be translated to some lovely island in the sunlit ocean, or to some bright and happy spot beyond the starry concave.

Before the science of astronomy had dawned, or had illustrated the real majesty of creation in the illimitable extent, and immutable laws of the universe, many generations of men had lived and died, and though it was an illusion of imagination, it was certainly a most impressive source of devotional feeling to our Pagan predecessors, that they gazed on the constellations of Heaven, as the abodes of the immortals, and the resting place of their translated heroes. Their poets sung of human destinies as the result of celestial arbitrament, illustrated death by the waters of oblivion, and portrayed with graphic power the facetious old ferryman who transported the constantly arriving groups of disembodied mortals to the shores of eternity, beyond. There, on the one hand, imagination lighted before them the horrid drama of the infernal regions; their heroes passed the fire-breathing watch dog, and entered vast arenas clanking with chains, and howling with the perpetual torments of the wicked; there too, beyond the dark waters of oblivion, the poetic legends of the ancients pictured the venerable father of the gods, amid the assembled deities of Olympus, and the delightful landscapes of Elysium, where the spirits of the just enjoy happiness consummate and everlasting.

These brilliant fables of original mythology have been more or less incorporated with the various systems of philosophy, of policy and of religion, which have been adopt-

ed by succeeding generations, and which have formed the great and changeful structure of human society. The sublime conceptions of the starry concave, the sincerest and most exalted sentiments of Deity and of devotion, have been strangely interwoven with the most absurd rites, superstitions, and ceremonies, the wildest fictions of the darkest ages. Oracles, augury and omens have successively exerted their mighty spells of enchantment, among the most distinguished nations of antiquity ; the tributes of ages, the spoils of the conquered, the richest treasures of the proudest princes, accumulated at their mystic shrines ; the fate of battles, the succession of empires, the destinies of mankind, poised upon their fearful predilections.

Astrology pointed to the glittering spectacle of the Heavens, the priests of Isis and Osiris vied with the wise men of Persia and of Chaldea, and derived from their observations the rudiments of those astronomical results, which were to dawn slowly on future generations.

The stories of the Cyclops, and of the Gorgons, and of the Sons of Tellus, those earth-born giants, who scaled the battlements of heaven, gave variety to the legends of mythology, astonished the devout, and terrified the ignorant.

The utmost genius of Grecian sculpture tasked itself to embody in breathing marble the beau-ideal of divinity ; and Phidias, the immortal sculptor of the Olympian Jupiter, anticipating by intuition the cerebral discoveries of subsequent ages, has achieved a statue from a block of the marble of Paros, which all generations must admire, as worthy of the venerable father of the gods.

Sybils and Sylvan deities, inspired awe in the shades of the forests, or the sanctuaries of the temples. Household gods presided in the tents of the Hebrew patriarchs, in the camps of the Grecian chieftains, and in the palaces of the Roman consuls.

Among the most celebrated philosophers of antiquity,

some not only assented to the popular fanaticism, but gloried in adding intricacy to delusion, and labored in grouping strange and imposing fictions.

The doctrine of transmigration, originating in the fabled self-concealment of the gods, when driven from heaven by the victorious Cyclops, in the forms of inferior animals, extended the worship of incarnate Deities, even to the lowest orders of reptiles, as well as to the leeks and onions of Egypt.

Pythagoras, who had witnessed this worship during his travels in the East, extended transmigration to men, and had the assurance to relate to the Grecians the events of previous centuries, as his own personal recollections; and among other fables, that he had fought five centuries before under the name of Euphorbus beneath the banner of Achilles, and recognized, as his own, the shield of that hero, which was then hanging, where it had hung for ages, in the temple of Juno.

It is very lamentable that men of respectable or superior intellect, should so frequently have lent themselves to humbug, and that truly honest and ingenuous minds should be so rare.

The veneration and reverence which men naturally feel for the sacred inspirations of religion, have been in all ages imposed upon by designing hypocrites, or self-deluded enthusiasts, who, pretending to be the especial favorites of Heaven, have taught the multitude subservience to their personal ambition.

To the doctrine of deities, disguised in the form of inferior animals and reptiles, Moses evidently alludes, when on the emigration of the Hebrews he included in his interdiction of false divinities the likeness of any thing "that creepeth under heaven."

The gods of the Amorites and Hittites, and the dust of the molten calf of Aaron, mingled with fragments of the

Christian emblem lost in the campaigns of the Crusaders, have mouldered for ages beneath the Ottoman Crescent. But the worship of idols still exists in the most ancient and populous nations of Asia, in the valleys of the Andes, and the far islands of the Southern Ocean.

Even where Christianity has superseded Pagan idolatry, and has encircled with statues of Saints and of Prophets temples vast as the pyramids of Egypt, and splendid as the palaces of the Moguls, she has not entirely disrobed herself of pagan superstitions, (dark and diverse mysticism broods on the battlements of her convents,) and the sincerest inquirers are well nigh bewildered in the contending dogmas of her churches. Milton, by combining the most imposing delusions of Pagan mythology, and the most brilliant conceptions of ancient poetry, in which the human imagination had delighted for ages, with the sacred history of the Hebrew Pentateuch, has done much to engraft the portentous mysticism of the Pagans on the religion of our fathers.

In later ages, Druids, genii and fairies have succeeded to the supernaturals of antiquity, or have originated in the mythology of trans-Alpine Europe, and inspired terror to both Goth and Gaul; trains of disembodied apparitions still haunt the cemeteries and ruins of our Saxon ancestry, and we ourselves have trembled at the goblin stories of our nursemaids.

The history of religion, considered in a manner commensurate with its extent and importance, is unquestionably one of the most remarkable illustrations of human mind, character and civilization: it would embrace the religion of Egypt and of China, of Chaldea and Hindostan, of Judea, of Greece, of Rome, of Russia, of Britain, of Mexico, of aboriginal America, with all the changes which centuries have impressed upon their spirit, their ceremonies and rituals.

The history of the devotional sentiments, or the natural history of man considered in relation to his Creator, in all its present existing diversities, in connection with its annals throughout all ages and countries, has never yet been broadly and philosophically written, disconnected with the polemics of particular churches.

We have alluded to the faculty of imagination as being the author of language and of poetry, and blending with the devotional inheritance of the nations. Imagination, though often libelled, is a most essential active faculty of the mind, giving force and energy to the objects it presents; energy to the passions, ardor to devotion, identity to superstition. Imagination entrances the enthusiast in love, and the devotee to science: it affects the hypochondriac with thousands of unreal evils: it maddens the fanatic to his wildest aberrations, and deludes the bigot when he esteems himself the peculiar favorite of Heaven. The Pharisee, whose prayer at the temple of Jerusalem is recorded in St. Luke, "God I thank thee that I am not as other men are," was evidently under the influence of imagination. It was imagination which sustained the constancy of Ulysses in his protracted wanderings; inspired with indefatigable perseverance those knights of the cross who led their bands of pilgrims across the burning sands of Syria to the tomb of the Saviour; and 't is the future delights which it pictures which give to the Moslem warrior his recklessness amid the storm of battle, and enable him to die calmly for his religion and his country, beneath the standard of his Prophet.

It is a common error which needs to be corrected, to suppose that those individuals who write, or attempt to write rhymes or romance, are the only weak and wayward brethren whom imagination lures from truth and soberness.

It is imagination which bewilders the votaries of the silliest superstitions, as well as the aspirants after the sublime and the beautiful. It is the principle on which quacks and

demagogues exert so predominating an influence, and forms the basis on which charlatanism in politics, in medicine, and in literature, entrenches itself, constituting what has been called the gullibility of mankind.

Imagination undoubtedly inspires the votaries of the fine arts; it is essential to the sculptor and the architect; to the painter, the musician and the poet; it allures the naturalist with a thousand visions, lovely as nature's delightful realities: fills your would-be philosophers and men of leisure with every variety of miscellaneous folly; and warms your men of wealth with the delusions of avarice.

It is admitted that madness invariably takes possession of the mind that broods overmuch or overlong on one engrossing idea; and ill-regulated imagination, producing various misconceptions, often exists in men who imagine themselves of all mankind the most correct and prudent, and monomania of some sort seems almost to be a common inheritance.

The imagination may exert as remarkable activity in schemes of traffic and speculation as in any thing else. Over-estimations of particular objects, as the South Sea bubbles, the Holland tulip mania, the merino sheep fever, and morus multicaulis speculation of the United States, are among the thousand results of diseased imagination in matters of commerce.

The attaching undue importance to particular pursuits, or to particular men, to one's own partisans and one's own achievements, and over-estimating the importance of our actions and opinions to society, although often doubtless constituting much individual self-regard, are remarkable follies of the imagination.

Imagination, however, though capable of countless absurdities, certainly exists as an important and inseparable element of man's noblest, as well as his humblest nature; blending extensively alike with the happiness and hopes of

his youth; with the deliberations and maturest reflections of manhood; and with those bright anticipations of a future and better existence, to which the aspirations of all nations and ages direct the attention of the species.

“Men of imagination” have been denounced as a select class, and have been accused of disqualification for the sober realities of life; the truth is and ought to be acknowledged, that all men, stupid or not stupid, are men of imagination.

In early inexperienced infancy our imagination deceives us as to the value of reddening unripe fruit; in youth, the soldier’s imagination deludes him with the pomp and equipage and circumstance of war, till he leaves his peaceful home, and follows proudly to the tented field.

Imagination lends itself to love’s enchantment, and lovers often are, or appear to others to be, excessive in their devotedness. The coward over-estimates life in comparison with duty and patriotism, self-respect and honor.

The fondness for what is ancient and unique, the passion of antiquarians, often amounts to folly in the estimates of men not possessing the same tastes, just as the fondness for novelties, for the newest mode, often induces men of fashion to disregard obvious utility.

In short, every thought and every act which is not based on broad, comprehensive, complete views of nature, is pedantry, puerility, passion, superstition; all which does not teach men carefully to think, and to embrace the entire truth of every subject, is not reality, it is imagination.

It must be acknowledged that we are constantly liable to exaggerate the importance of certain pursuits and of certain objects; our ideas even of utility often deceive us, when we neglect health and tranquillity in the inordinate pursuit of gain or pleasure; we cherish one particular train of ideas, we do not sufficiently generalize and compare the real value of the various pursuits of men, the real comparative importance of wealth, of knowledge, of health, of tranquillity, of

the affections, of religion, to the happiness of human existence.

We have many homilies on the frailties of genius and on the follies of literary men—"the genus irritabile vatum"—this is perfectly fair, if you will also give us the follies of men of every variety and contrast of character. It is beyond dispute that men of genius, who may be defined to be, men of extraordinary intellectual achievements in every department of knowledge, have been addicted to every vice as well as to every virtue; but it should be borne in mind that no class of men are so well known to the public as those distinguished for their mental characteristics. The public, whether for good or evil, interests itself more in their vices and foibles, while the vices of men of rank, station, fortune, of princes, of politicians, of millionaires, are comparatively unnoticed by the critics, the gossiping vulgar, and the public.

In connection with the effect of imagination in exaggerating the value of wealth in general or some species of worldly possession, may be instanced that remarkable variety of insanity, *a sense of poverty in the midst of affluence*, with which God frequently afflicts the votaries of avarice, which the Romans well designated "*miser*," miserable, and which is so common among the rich and retired traders and bankers of metropolitan cities as to have acquired the designation of "*the city disease*." The want of foresight and improvidence in spendthrifts is equally insane, and forms at once the antithesis and the apology of avarice.

Imagination is equally active in producing all manner of predilections, prejudices, suspicions and jealousies, as it is in castle building and in all the cherished follies to which poor human nature is liable. In short, as no man is without imagination, that man only is wise and happy whose imagination is well regulated, whose discretion and judgment control his own decisions as well as the thousand sugges-

tions which the imaginations of those around him are constantly presenting. How few are truly wise!

Imagination, in this its best significance, is that faculty of mind to which we are indebted for most or all of the inventions and improvements of civilization; for those developments of the sublime and beautiful in nature; of the past, the distant and the future, which its votaries in all ages have left us, and for those combinations of physical and analogies of abstract phenomena, which constitute the grandest discoveries in the useful arts, and the sublimest achievements of genius, both in eloquence and in action.

Imagination is the basis of both poetry and eloquence; it has existed in no ordinary degree in the greatest men, those who have risen above the beaten paths of their fellows, in all nations and ages. It inspired Homer and Demosthenes, Job the patriarch, and Mahomet the prophet; it gave grace and illustration to the mighty conceptions of Dr. Johnson, to the gigantic projects of Napoleon.

The despotic influence which imagination has exerted, and the thralls which superstition has fastened upon mankind, until they have become sanctioned by the assent of ages, are fading slowly before the light of truth and reason; while its sound and legitimate exertions will continue to be highly and justly estimated, during the most enlightened eras of the future, to which our race may be destined.

But it is time to resume your careful observation of the scenes below us.

You will notice the immense populousness of Asia, compared with that of the American continent. You are one of a thousand millions of cotemporary human beings. Of these thousand millions, more than half are inhabitants of the continent of Asia, which is now gliding in broad perspective below us. You may observe that the population is not universally distributed, but that while many portions are teeming with fertility, and sustaining

great numbers of people, others are extensive deserts, only inhabited by a few herdsmen and robbers, on which, nevertheless, vast and magnificent ruins indicate the ancient sites of very powerful and populous nations.

These ruins are the localities of those great dramas of empire, of which history affords us some outlines: where the civilization and the folly, the pride and the variety of human destiny, may be advantageously studied, in connection with the causes which have changed to solitary deserts these once fertile and populous regions.

The thought-gifted animal is gregarious. Fondness for society, constitutes an instinctive and inseparable part of his nature. Consciousness of a common destiny, and of common wants, sympathies of sensation, of the intellect, and of the affections, incline him to sociability. It has characterized the rudest barbarians in all ages, and continues to exert undiminished power in the most enlightened eras and nations. The wandering Arabs congregate for defence or pillage; the outlaw, the bandit and the pirate associate for depredation; the American hunter shares with his tribe the spoils of the chase, as naturally as the artists and savans of the most civilized countries associate to impart the results of thought, and to contribute reciprocally their little gatherings of knowledge.

Man's intelligence is progressive; he advances from the pausing point of his predecessors: in consequence of his social instincts, language and letters, he possesses the exclusive attribute of recognizing the experience of past ages, and of availing himself of cotemporary knowledge. While the brute animals, the elephant and the eagle, procure their food, protect themselves from the weather and build their nests, after the manner of their sires of the remotest ages, man has acquired knowledge with irregular but certain advancements, and is at once capable of appropriating whatever has been known, whatever all previous ages have

achieved for the happiness of his species ; and of adding, in turn, his own deductions to the transmitted wisdom of the race.

Hunting and pastoral pursuits appear to have preceded agriculture in all nations. Man tamed and domesticated the animals of the chase, and became a shepherd and herdsman. He became acquainted with valuable plants, and discovered the advantages of cultivating them. The pursuits of the husbandman give to men a local habitation, and promote civilization beyond those of the hunter and herdsman, and it was amid cultivated fields, that hamlets first grew into cities, distinguished as the seats of empire, of the arts and of commerce.

The circumstances, or more properly the facts of his physical condition, his locality, the home of his childhood, the place of his birth, whether under the tropics, in the temperate latitudes, or adjacent to the arctic snows, have indisputably an immense influence from causes purely physical, on the nature and characteristics of man.

The fact that the seats of empire and of civilization, the homes of those nations who in all ages have been distinguished for superior physical endowments and intellectual advancement, have been in climates between the extremes of heat and cold, proves that the middle latitudes are most favorable to human existence.

An infant born under a palm or banyan tree, to be enervated by the perennial influence of a vertical sun, and with the spontaneous fruits of perpetual summer around him, would acquire, even if he did not inherit, the indolence of his fathers. Or were he born in the snow-built hut of a Greenlander, his mere existence would be an effort, and the supply of his simplest wants the utmost point of his ambition. The facts in both these cases are inevitable, they are the result of uniform laws, and there can be little doubt but that a colony selected from the most favored regions of the

earth, and acquainted with the arts of civilization and of life, could not long maintain its character in the Arctic or Torrid zones, and must, whether transplanted to Lapland or Siam, assimilate, in a very few generations, to the native races.

How far they would assimilate, and whether climates and habits of life continued for an hundred generations would eventually triumph over the original characteristics of the exotic race, is a point on which naturalists would differ, and it would be presumptuous to determine. It is also asserted, that the unmixed African race is capable of a considerable approximation to the Caucasian varieties, and this result is probable when transplanted for a course of generations to a temperate climate.

It is even possible that the strongly marked specific differences of the races of men may have been caused by the varieties of their climates and physical condition, but it must be left to future inquirers, to ascertain whether the physical differences, so obviously discernible in comparisons between the Caucasian, Mongolian, Ethiopian, Malay, and other varieties, are the *cause* or the *consequence* of the peculiar mental characteristics, by which the various races of men are now so distinguished.

Fertile or sterile soils, producing food almost spontaneously, or requiring incessant and provident industry, necessarily produce varieties of muscular, mental and moral development. Whether born to exuberance beneath the skies of Greece or Italy, to drink camel's milk on the deserts of Zara, to snuff the mountain air of Switzerland, of the Scottish highlands, or the Cordilleras, to wander on the prairies of America, or the plains of Asia, man is, in important respects, the creature of his various condition; he is to some extent the heir of a destiny, the result of physical and mental causes around him.

The superior fruitfulness and local advantages of certain districts, such as the delta of the Nile, or the valleys of

Greece, naturally attached their inhabitants, originated the idea of property, and of a fixed home, and incited men to love and to defend their country.

It has been written that "mountains interposed, make enemies of nations," but it is sufficiently obvious that intervening mountains, accessible only by such passes as those of Thermopylæ, were essentially necessary to defend the infancy of civilization from the rapine of neighboring barbarians; and were in fact not less important as natural boundaries of nations, than as the sources of the great rivers.

Would it be possible for a race to acquire, in any equal degree, the habits and the arts of civilization, where boundless plains offer no barrier to the wild and the warlike, and where the horseman emulates in freedom and in fleetness the whirlwinds of the desert !

We believe that it is in a great degree from this fact of their local condition, that the aboriginal red-men of our North American prairies have acquired and perpetuated their characteristics; from this fact also, and not because he is the son of a bondwoman, the Tartar robber still follows the profession of his fathers; while, (if we may be allowed the digression,) his brethren the Hebrews have experienced greater physical and moral vicissitudes, scattered among the empires, excluded by the jealousy of Christians from the possession of real estate, have become naturally adepts in the management of personal property, and are, at this present moment, the money changers, and the most opulent bankers of Europe.

The vicinity of ocean, harbors and contiguous islands, incited the first efforts of navigation, that most important coadjutant of civilization. If it was in a locality such as the lovely valleys of Greece, that the arts found their most favored and congenial dwelling-place, the Grecian Archipelago, clustered with fertile islands, and in a salubrious

and delightful climate, was from equally natural causes the cradle of commerce. It was there that thousands of unskilled and incipient voyagers had meditated and achieved enterprises of various disaster and success, previous to the time of the Argonauts, all of which were necessary to the gradually increasing confidence and prowess of the bolder adventurers on the restless billows, till the glorious discovery of the magnet, and the immortal voyages of Columbus. Had this extraordinary man been born amid agricultural scenery, or on the plains where the wild horse is grazing, he might have been a Mæcenas, or a Hannibal; but he was the son of a fisherman, and drew his first breath in a hut, perched on the shore at the foot of the precipitous ocean cliffs of the coast of Genoa; his territorial inheritance and his destiny were those of a sea eagle. It was from such appropriate locality, that the infant discoverer of the New World attempted his first enterprises on the wide waters, the necessary precursors of his manhood's achievements; achievements which have immeasurably extended the sphere of civilization, and the effects of which on the universal destinies of mankind, physical, mental, and moral, it will be presumptuous to estimate, until the annals of an hundred centuries shall have accumulated on the files of the historian.

The facts of the accumulated advantages of locality, which seem to render Greece the natural birth-place of civilization, corroborate those by which Dugald Stewart has endeavored to trace to Greek origin the ancient civilization of India, and refers to the Greek colony of Bactriana the philosophic language of the Brahmins.

Another local cause of comparative civilization, and one of vast importance, is the various distribution of the great geological formations, which give character to the soils and determine the localities of minerals and metals.

About one-fifth of the rocks of the earth's surface are of

lime, which forms the basis of the most fertile soils, and of course determines those districts which are most capable of sustaining a dense population.

The presence of rocks affording building materials, at once easily wrought and durable, like the argillaceous and granitic cliffs of the Nile, exerted an immense influence on the comfort, character, and immortal remembrance of the ancient Egyptians.

The existence of a material so beautiful as the Parian and Carrara marbles, doubtless originated and sustained the various efforts which have resulted in the perfection of Italian and Grecian sculpture. It would be interesting as a lesson in art, to trace the progress of sculpture, from its first idle fancies, and to bring together in a chronological series all statues of merit, from the earliest rude chisellings of the ancients, to the unsurpassable beauty of the Apollo of Belvidere.

The early discovery of copper and of gold in Asia might have given her a splendid but ineffective civilization like that of the trans-Atlantic Montezuma. But the subsequent discovery of native iron in the island of Elba, was essentially necessary to the arts and glory of the nations of Southern Europe; without it, their remarkable achievements as well in war as in sculpture, and the innumerable manipulations of civilized life, could never have been, and even the force of their national character and the themes of their immortal poets would almost have been wanting.

It is unnecessary to trace minutely the vast and magical effects of the uses of this noblest of metals; and of the numerous groups of less important metals and minerals, which have in later ages presented themselves to the untiring ingenuity of our species, and given new impulses to the arts and arrangements of life, or to make any other than a reference to the new combinations which chemistry offers

to the useful and elegant, the moral and political destinies of man.

The simple self-evident fact, that had not coal and iron existed in the hills of England, that wonderful island would have remained to be comparatively insignificant in power as she is in extent, her monarchs would never have meditated or achieved the empire of the ocean, or have planted colonies in every quarter of the globe; her merchants would not have insinuated her manufactures, the triumphs of her arts, wherever civilization penetrates, or wherever the savage roams, by the rivers of India, Africa, and the two Americas.

“Hail, adamantine Steel! magnetic lord,
King of the prow, the ploughshare and the sword,
True to the pole by thee the pilot guides
His steady helm amid the struggling tides;
Braves with broad sail the immeasurable sea,
Cleaves the dark air and asks no star but Thee.
By thee the ploughshare rends the matted plain,
Inhumes in level rows the living grain,
Intrusive forests quit the cultured ground,
And Ceres laughs with golden fillets crowned.
O’er restless realms when scowling discord flings
Her snakes, and loud the din of battle rings,
Expiring strength and vanquished courage feel
Thy arm resistless, adamantine Steel.”

Of the consequences and results to society and to individual character, on the fleeting theatre of cotemporary existence, and on the permanent civilization and happiness of the species, the very various modes of government are to be considered as among the most important causes.

The origin of government seems to have been a natural result of reverence, gratitude and confidence, inspired by individuals of superior wisdom and courage, whose acts and counsels, whose energy and experience, constituted them benefactors and preservers of the common welfare.

Government has, however, seldom long remained free from the frailties of human nature, and the abuses consequent on the possession of power. History, sacred and profane, is stained even at its fountains with bloodshed and injustice.

The paternal government of the patriarchs, and the happy and tranquil serenity of the golden ages, seem to have been equally subject to the collisions incident to human nature. Moses, the sacred historian, narrates horrid fratricide in his fourth chapter, and Homer, in the second line of his *Iliad*, affixes the epithet implacable, to his hero, "the godlike Achilles," "the bravest of men."

[The first homicide on record originated in religious rivalry; the first celebrated war of antiquity in the abduction of a faithless woman. Religion is still fruitful of dissensions, and love yet remains to be the strongest of human passions.]

Man has always been, to some extent, a quarrelsome animal; ambitious of power, impatient of control, and disregarding of the rights of others, even long before the gradual accession of the arts and artificial wants of society had developed the spirit of trade, and the ages of chivalry had given place to those of traffic, and commerce became the golden apple of the nations.

Muscular strength and personal valor were more valuable and distinguished in the earlier stages of human society, when law often degenerated into the right of the strongest; bravery and dauntless prowess were necessary to withstand the inroads of barbarians, and to awe the jealousy of rival chieftains; courage, energy and decision are inestimable qualities; they are the appropriate guardians of the gentler virtues, and, in combination with them, constitute magnanimity or moral greatness.

Man is the only animal that systematically associates for the destruction of its species. Military glory, the brilliant

achievements of conquest, the stirring incidents and adventures and spoils of war, the indolent and care-exempted life of a soldier, seem to have always awakened in the human breast impulses amounting to a passion. The veteran follows, with extraordinary thoughtlessness, his victorious eagles, and even where the bones of his wounded comrades crash beneath every tread of his charger, he returns to the combat of aggression with an ardor and devotion scarcely exceeded by that which prompts men to the defence of their altars, their harvests, and their firesides.

Military glory has been in all ages among the shortest paths of ambition; the proudest empires of antiquity were founded on the field of battle, and conquerors have rivetted the chains upon their vassals, while they revelled on the spoils of vanquished nations.

There can be no doubt, however, notwithstanding that the alliances of despots and the fierceness of democracy have perpetuated to our own times the pomp and circumstance, and unspeakable horrors of war, that the progress of just and comprehensive knowledge will induce mankind to award merited and apportioned detestation to the destroyer of cities, as certainly as to him who plunders a hamlet.

Among the effects of war, of conquest and of subjugation, are the mutual interchanges of knowledge, and common property in the arts, which conquerors and conquered have derived from each other.

The Roman legions carried civilization over her extended empire. The soldiers of her numerous military colonies, exiled from their own Portias and Cornelias, intermarried with the women of the provinces, cultivated the fields of their fathers-in-law, and grew old, rich in the priceless gifts of the affections; this "intermarriage with barbarians" was sometimes the subject of severe reproach by the citizen patricians of the forum; but what was the proud

nationality of the empire to the expatriated soldier destined to spend his life in foreign service, afar from the loves of his youth !

The numerous prisoners, too, of her all-conquering armies, whom she doomed to the servile toils of the commonwealth, and who built up the marble monuments of her greatness, soon acquired, even in their greatest degradation, some degree of the civilization of their masters, and often became, as "freedmen," or the sons of freedmen, sharers in the councils and glories of the republic.

The influence of the superior civilization of individuals and nations, when subjugated by barbarian conquest, has been scarcely less than as conquerors. The races of the Caucasian mountains have often waged unequal war with the surrounding nations, the Turk, the Persian, the Tartar and the Russian. The distinguished beauty and intelligence of their women have for ages made them an article of merchandise with the bearded masters of Asia, and the nobles of central Europe ; they have often become the favorite sultanas, and the race of barbaric monarchs has thus been improved by alliances with their captives, and humanized by the influence of the conjugal and maternal affections.

Among the effects of the discoveries and conquests of the companions of Columbus, on the entire civilization and destinies of mankind, is to be estimated the Slave Trade, which has colonized the plantations of the new world with kidnapped Africans.

Slavery is to be contemplated in its great aggregate effect on the population of future generations in both hemispheres. [God brings good out of evil ; "all discord harmony not understood ; all partial evil universal good".] It is true that the individual immediate effect is often great suffering to the slave, and doubtless great moral degradation from the influence of luxury, and avarice, and cruelty, which may

be its consequence to the master. If civilization is a blessing, the uncivilized races of Asia, America, and Africa, strongly attached to their hereditary habits and superstitions, can scarcely be civilized without the use of means, not exactly recognizing their abstract rights of independent opinion and action. In infancy we do not choose our own schoolmasters; the ancestors of the present generation of European peasants had no choice in the origination of their relations to the feudal aristocracy, who have for ages lived in luxury upon the fruits of their labor and that of their descendants. The question results, is it a law of human nature, taken in the widest and permanent sense, that the more intellectual men and the more intellectual races have a natural predominance over the more animal races? the moral state being the same—that is, the most intellectual is likely to govern among pirates, saints, or savages.

As the native trees of the American forest would never yield to the plants of civilization, without the strong arm and determined purpose of civilized man; as the Durham ox supplants in the valleys of the tributaries of the Mississippi the native wild beasts, so the American aborigines, though superior to the negro, seem destined to shrink before the European races. The Indian and the buffalo are noble but untameable animals, or if not entirely untameable, it is easier to introduce the already domesticated ox of Asia, and men of the Caucasian race. Man is a cruel animal; the heart of philanthropy bleeds to discover it.

Slavery is doubtless a great moral evil. In common with much of truth and error, in theory and practice, it existed in the times of the patriarchs, and has been variously perpetuated through ages of feudal and despotic oppression to the present time.

The law of force and fraud still exists in the practice of the most enlightened nations; the Christian Anglo-Saxon race found the inhabitants of the North American forests

brave, and incapable of being subjected to servitude. It has exterminated them! The races of tropical Africa and Asia are more docile, and capable of being made burden bearers. It has cruelly kidnapped and transported these to cultivate the soil of the extirpated Americans.

In the East it has been equally active; bearing the precepts of Christianity in one hand, and the sword in the other, it has subjected to its dominion 150,000,000 of the natives of Asia; and Britain, while she emancipates the negroes in the West Indies, is accused of compelling the Chinese to take the cursed opium, which is the article from which a part of the revenue of her Anglo-Indian possessions is realized.

A negro population is a misfortune to America; it were more desirable that her soil had been colonized exclusively by the superior races. Still she has climates where it is justly asserted the Caucasian races can hardly maintain their characteristics, and to which the negro, whether in bondage or freedom, is by nature better adapted.

Domestic slavery to the individual is often the means of proximate civilization, and the children of these negroes may not improbably be destined to re-colonize the country of their fathers, carrying back the knowledge of the more enlightened nations to the sources of the Niger and of the Nile.

Though it may be gravely doubted whether civilization can be satisfactorily established in the Equatorial or Arctic climates, yet civilization may do much to modify and control the physical conditions which surround the natives of those less favored climes.

The stronger animal of the forest triumphs over the weaker; in other cases feebler gregarious animals combine and effect the conquest of their enemy by united effort.

Civilization increases the warlike power of a nation, not only by its arts but by the great superiority of civilized men,

in subjecting themselves to the perfect discipline and combined action, under some known commander, which is indispensable to the maintenance and movements of large armies. The arms of civilized nations therefore are destined to triumph over the comparatively undisciplined hordes of the barbarian, and semi-barbarian races.

It was the civilization, the capability of discipline, the mental superiority of the Greek and Roman soldiers, which rendered them invincible; which enabled them to triumph over the physical force of the barbarians around them—to propagate civilization to the North and the South. And it was hence that the Gauls, and Germans, and Britons learned their first and essential lessons of civilization.

Civilized nations are indeed often degenerate, and war has been the scourge of degeneracy: the luxury consequent upon wealth and indolence has often obliterated, in a very few generations, those manly virtues which have generally distinguished the founders of empires.

I shall not allow myself to suppose that you are wearied with such general reflections on the human race, its history and civilization, as our panorama of the site of the old empires, of the home of the noblest variety of the species, and generally of the most populous portion of the planet, may suggest.

Our position at the fortieth degree of North latitude, may be assumed as a central line of the Temperate Zone of the Northern Hemisphere, and if, as we have before suggested, temperate climates, the middle latitudes between the extremes of heat and cold, are, as is universally acknowledged, most favorable to human existence, we could not have chosen a more fortunate or more central latitude,—one more likely to illustrate the distinguished scenes of human achievement, or more favorable for philosophic reflections on the entire natural and political history of man. Accordingly, the sites of the most remarkable of the old and

extinct nations, of the most populous modern cities, as well as the most renowned cities of former ages, the locality of the Caucasian race, the sites of those two justly distinguished nations, Greece and Rome, to whom the human race is indebted for so much of its art, science, literature, civilization, and civil, and intellectual freedom, and where Christianity, and the noblest virtues of humanity, have been illustrated by imperishable examples, are contiguous to the fortieth parallel.

We shall, therefore, make the fortieth parallel our range for general reflections, in connection with a very attentive observation of the grand living sunset-lighted panorama which is rolling beneath us, and from which you must not for a moment entirely divert your attention.

Circassia, under the fortieth degree of latitude, is worthy of very especial observation. It is a subject of most important inquiry, under what circumstances man has here acquired and inherited his noblest physical and mental qualities, so as to have impressed the name of his mountain birthplace on that distinctive variety of the human race, whose colonies, surpassing all others, have planted the great nations, and have been the most distinguished pioneers of civilization in both hemispheres. The face of the country, diligently cultivated from the valleys to the mountain plains and summits of five-thousand feet elevation, presents every evidence of an energetic and highly civilized race. The mountain side landscapes are exceedingly beautiful and diversified, wonderfully populous, thickly studded with pretty cottages and cornfields, green meadows, in which fine flocks and noble herds are feeding, and sweet rivulets are bubbling up to cherish the flow of the Euphrates—groves and avenues of noble forest trees are casting their evening shadows on the contented inhabitants, happy in rural sports and agricultural employments, unusually vigorous and healthful, and the admirable beauty of whose

forms remind you of the classic models of Apollo and Minerva.

The Mediterranean with its northern coasts and archipelagos, and classic peninsulas, its polacres and gondolas, and ships of all nations, fading in the furthest perspective, are all gliding in full life and rosy sunset-light below us.

Its southern coasts celebrated in the past as the domain of proud Carthage, with its bands of wandering Bedouins, and its cities garrisoned by French soldiers, extend on our left.

On the right, a thousand picturesque landscapes, vivid with the glorious recollections and massive memorials of ancient Greek civilization, enlivened with flocks and herds, olive-groves, vineyards and villas, swell in graceful undulations from the purple waves of the Adriatic and the Ægean, to the summit of Mount Olympus, where the sunset is lingering on the hoary glaciers.

Amid the somewhat wild and neglected scenery of the Italian peninsula, you will still be reminded of Roman figures and Roman costume. Milk-white herds of gigantic and beautiful oxen, the very similitudes of their progenitors, which speckled the pastoral scenery of the age of Virgil and Augustus, are grazing beneath the colonnades of the old temples of the early Greek colonists in Latium, just as they were when the forest-nourished sons of Mars first assembled the rude elements of the Roman commonwealth. The evening air is fragrant and delightful, the tints of the sky, the snow-capped mountains, the exuberant valleys and the brute creation, at least, are unchanged; and amid all the recollections of Rome's bygone glories, give present enchantment to the land of Dante, of Petrarca, and of Boccaccio.

"Far to the right where Appenine ascends,
Bright as the summer Italy extends."

Let us call up the dramas of past time, and pass in their deliberate magnificence, the glorious pageants, the proud

dynasties, the individual achievements and noblest deeds of the favorites of history. Let us study the actual biography of earth's greatest legislators, philosophers and warriors.

In the earlier ages, the style of general history gives undue prominence to military affairs. The annals of the various conflicts of nations from the rude combats of the ancients, until the invention of gunpowder and steam batteries, and the modern field tactics and the coup de main of Napoleon, present a melancholy picture of human implacability.

If we call up from the history of past ages the actual scenes, the continuous pageants which have passed like fleeting dramas over the theatre of the ancient nations, we shall often observe the chosen seats of civilization crowded with the march of armies from far countries, and echoing with the triumphs of hostile barbarians.

Let us with due reverence domesticate ourselves with the Solons and Platos, the Lycurguses and Numas of antiquity. Let us accompany Alexander in his expedition to the Indus, attach ourselves to Cæsar in his conquest of Gaul, and make with Napoleon the campaigns of Italy, of Egypt, and of Russia.

The undated pyramids of Egypt looked down twenty centuries ago, on the hosts of the young and impetuous Alexander, whose ardent and invincible soldiers, wasted by fatigue and battle, in a few short years, had strown their bones from the valleys of their birth-place, to the rivers of India; and only a few surviving veterans bereft of their leader, in the prime of manhood, returned to grow old by the tombs of their fathers. And when the lapse of sixty generations had dropped the curtain on oft-succeeding groups of less imposing and distinguished actors, the army of the French republic, the men of the revolution, the same who had dragged their artillery with untiring energy across the Alpine ravines, the conquerors of Italy,

the companions of Napoleon, encountered beside these same pyramids, amid echoing trumpets, the fierce charges of the Arab lancers.

If we change our cosmorama to Greece, we shall see the halls of her classic temples, trodden successively by war-like barbarians: the verdant acclivities of her delightful valleys have alternately resounded, during thousands of years, the bleating of the flock, and the lowings of the herd, the pipe of the love-lorn shepherd and the din of war. The finest exhibitions of manly strength, the brightest visions of feminine beauty, the spells of ambition, of love, and of devotion, have existed in rapid and wondrous succession: and all that was terrestrial of her "godlike" valor, mouldered by the frosts of three thousand winters, and successively mingled with the ashes of heroes and barbarian soldiers, which succeeding ages have added to the soil, still give luxuriant vigor to the vine and the olive.

Further west, on the Latian peninsula, where the sons of Mars founded the seven-hilled city of the Cæsars, military glory was the star of the ascendant, and war became the absorbing occupation of the Romans; the portals of the temple of Janus were not shut during seven hundred years of perpetual war; and Rome became mistress of the world; but the days of her glory passed—Rome degenerated in her patricians—and the undisciplined hordes of the northern forests trampled the proud palaces of her emperors, and scaled the rock-built citadel of the Tarquins.

"O Rome, my country! city of the soul,
The orphans of the heart must turn to thee,
Lone mother of dead empires, and control
In their shut breasts their petty misery.
What are our woes and sufferance! Come and see
The cypress, hear the owl, and plod your way
O'er steps of broken thrones and temples,
Ye, whose agonies are evils of a day."

Let us study in detail the generalizations of history, and

occasionally concentrate our imagination on the most impressive scenes and eras of human annals. Let us contemplate these, not only in their aggregate effect upon the history of nations, but in their influence on individual man. Let us picture to ourselves France during the twenty-five years previous to the battle of Waterloo ; her internal dynasties and her relations to Europe. Let us study the biography of the Men of the Revolution, in all their details which illustrate the progress of the nation through that most exciting era. Let us follow the diary of Napoleon from his maternal nurture, amid the civil wars of his native island, through all the presages of his youthful predilections, his loves, his rejection by a merchant's daughter, his earliest fortunes and friendship with Madame Beauharnois, his triumph at the siege of Toulon, his appointment as General of the Army of the Republic, his meteor-like glories in the campaign of Italy, his successes at Marengo, at the Pyramids, and at Borodino, till the star of his glory waned amid the smouldering ruins of Moscow.

Let us instance, somewhat at our leisure, the immense preparations, the advance, the retreat, of the grand army of the Moscowa ! Let our panorama embrace the topography of Europe—the confederacy of the Rhine—the entire empire from the Danube to the Baltic. Let us trace upon it every river from its streamlet-sources in the Alps and the Pyrenees, on the plains of Poland, and of Russia, and particularize throughout the whole scene, amid intersecting valleys sloping to the Atlantic or the Mediterranean, every city and village, and cottage,—amid its varied culture and real life.

Let us observe five hundred thousand men, each agitated by the spirit of the era,—by the hopes, the sympathies, the individualized emotions of our common nature, taking leave of their loves, their wives and children, their mothers, their gray haired sires, and assuming the pageant costumes

of war, at every hamlet in la belle France, in Germany, in Switzerland, in Italy, in Austria, in Prussia, and in Poland—tearing themselves from home's endearments and requited love, hastening to that proud, ill-fated campaign; joining their comrades at the nearest villages, and thence in escadrons, battalions and divisions along the main roads, till having joined like the tributary streams of a mighty river, they advance irresistibly on the fields of Russia.

Let us watch the day's dawn on the field of Borodino—see Napoleon grouped amid his staff on an elevation overlooking the scene—hear him exclaim as the sun rises cloudlessly—"yonder is the sun of Austerlitz"—observe the opposing armies deploying upon the broad plain in silence, until the roar of two thousand pieces of cannon commences the wide line of battle!

Napoleon directs the coup de main on the Russian centre. The Russian peasant soldiers, enforced by the invocations of patriotism and religion, sustain the successive shocks with the most obstinate intrepidity. Napoleon continued to order forward fresh divisions. There perishes at the head of his column, Le Brun, the favorite of the army. The slaughter is tremendous. The wide struggle of the battle is impeded by a quivering rampart of the wounded and the dying—charge succeeds charge, clambering over their fallen comrades. There falls amid the melee the young and gallant Caulaincourt.

At length the French columns obtain possession of the first line of redoubts; but the Russian masses still rallying amid the fire of their opponents, returned with indomitable courage, till night terminated the conflict, leaving the French in possession of the field, on which thirty thousand Frenchmen, forty-five thousand Russians, and twenty-five thousand horses, were hors du combat.

Let us observe the onward march of the French till they possess themselves of the vast suburbs of Moscow, and the

venerable battlements of the Kremlin—till lighted by the unsparing torches of her own citizens, the vast city curled into billows of flame, and the stormy winds howled over the black, desolate, inhospitable ruins of the ancient city.

Let us follow with absorbed attention the sad retreat of that mighty army, till the bones of its bravest legions are strewn over deserts of snow, or engulfed in the frozen current of the Beresina, till English vessels brought away their collected bones by shiploads, for the commonest purposes of manufacture, and their proud commander brooded over his eventful life and the fallen grandeur of his empire, on the barren mountain-rock of St. Helena.

THE RETREAT ON THE BERESINA.

The glare that lit the northern sky,
 Upon the raging tempest driven,
 Diffus'd its lustre far and high
 Where Moscow's fires arose to heaven ;
 And bursting on the noon of night
 Reveal'd the bivouac's curving line,
 And dimm'd the watchfires' paler light
 Where camp'd the armies of the Rhine.
 The Gallic eagle smooth'd his plumes
 Above the birth-place of the Czars,
 The sacred temple of their tombs,
 The castled eyry of their wars.

Thence gazing o'er the billowy flame
 Napoleon fix'd his restless eye,
 'T was the proud crisis of his fame,
 The haughty monarch heaved a sigh.
 Wild and unfathomed feelings there
 Usurp'd the impulse of his soul,
 Sated ambition, glory, care,
 The madness of supreme control—

The past, since fortune's wayward smile
 Had called him from his native isle,
 To rule the spirits of his hour
 And wield the wand of pageant power—
 The future's dim and doubtful dream,
 Its promised triumphs, and its date,
 Came o'er him like a dazzling gleam
 Amid the gathering storms of fate.

Fierce, lurid ruin, uncontrolled,
 Around the beetling Kremlin roll'd ;
 The soldier, lighted to the spoil,
 Revels in Russia's proudest halls,
 'Till wearied rapine yields to toil,
 And famine haunts the blackening walls,
 While 'mid her self-devoted fires
 Thunder old Moscow's falling spires.

Stern destiny, whose reckless ken
 Is wont to dwell on scenes like these,
 The doom of empires and of men
 Matures her terrible decrees.

Homeward reluctant from afar
 The hero wheels his gilded car ;
 Around their demigod of war
 Follow the nations' plumed tide,
 The chosen of chivalric lore,
 The fiercest legions of his pride—
 Trophies revered in olden time
 Roll onward 'mid the vast parade,
 And gorgeous spoils of every clime
 Bring up the lengthening cavalcade.
 Earth, and her annals, may not boast
 A mightier or a braver host,—
 There foremost tread that star-lit band
 Who nursed the eagles of their land—
 Soldiers of fortune and romance,
 Who bore above the Alpine snow
 And barrier stream and trenched foe

The victor bird of France ;
 And braved, 'mid Egypt's sand-swept seas,
 Beneath the tombs of centuries,
 The Moslem's reckless lance—
 And gayer bands of conscript youth,
 Nursed in her matchless schools of war,
 Are gathered with devoted truth
 By glory summoned from afar—
 When, 'mid the roseate light of morn,
 Upon the glacier echoes borne
 The stirring tocsin wildly rose,
 The music of the heifer-horn
 Falter'd upon St. Gothard's snows—
 War's syren-tumult from the vales
 Breathed rapture on the mountain gales—
 The hunter from the Oberland,
 The herdsman of the green Valais
 'Neath the gay banner of his band
 To the far crusade tore away—
 And fairer climes, where summer smiles,
 Where the perennial myrtle blooms,
 Where lovely woman most beguiles,
 Where cypress shrouds the Cæsars' tombs,
 All sent their chosen legions forth
 To breast the ramparts of the north.

Those banners of imperial France,
 On the same desolated track
 Whence rushed their desperate advance,
 Turn from resistless winter—back.
 Around the cautious Russian poured
 His countless serfs in marshalled bands ;
 And Asia sent her Cossack horde,
 Whose chargers swept the desert sands.
 But not to these that host shall quail,
 Or battle storm, or soldier's grave—
 Those Scythians are of no avail,
 They bring not terror to the brave—
 More cruel ministers of fate
 On that devoted host await :

The freezing torrents treacherous flow,
 Consuming famine and fatigue,
 The bivouac of the sky and snow,
 The lingering march of many a league,
 Shall bring the gayest warriors there
 To hopeless ruin and despair.

In vain the coursers of the Rhine
 Enflank the bayonet's bristling line ;
 The cavalier whose bounding steed
 Once matchless where the clarion led,
 Had rush'd to many a daring deed
 O'er reeking ramparts of the dead,
 Must leave that faithful friend to die—
 Proud sharer of his toils and pride,
 Whose famished form and faded eye
 Told him a tale that hope defied—
 His spirit yields to mightiest ills
 The cherished glory of his art,
 Rude selfish desperation chills
 The wonted feeling of his heart.
 There as he slowly sinks to die,
 E'en spite of hope's sustained control,
 The struggling tribute of a sigh
 Bursts deeply from his dauntless soul,
 As if he cursed the luckless day
 That called him to the wars away ;
 From the bright valley of his youth,
 Home's, life's, affection's strongest ties,
 And his lov'd maiden's parting truth,
 Pledge of his mightiest energies.

With haggard visage, grim and wan,
 Those victors of earth's proudest fields,
 'Mid endless snow-drifts flounder on,
 While the strong pulse within them yields—
 The speaking of each laurel'd brow,
 The bearing of each storm-blanch'd plume,
 Are stern and mute endurance now,
 Reckless of fate's severest doom—

Before them, desert tracts of snow
 And war-wrought ruin meet the eye,
 Around them yells the Tartar foe,
 Above them scowls the wintry sky—
 Still glory's flickering meteor-star
 Illumed that broken faltering band,
 And nerved the iron heart of war,
 Where yet the sacred legion bore
 The sullen eagles of their land.
 Still the shrill bugle's wildest power
 Recalls the pride of other years,
 And 'mid the horrors of the hour
 Triumphs o'er present ills and fears.
 Plunging in Lithuania's woods,
 That famish'd tempest-stricken horde,
 That wreck of mightiest armies pour'd,
 Engulf'd 'mid fir-clad solitudes,
 Where Beresina's pauseless floods
 Rolled on as if they scorned to know
 The nearer march of friend or foe.
 The fragile surface of the wave,
 And promptest skill of engineer,
 Give passage to the anxious brave,
 Behind the Cossacks' rude career
 O'erwhelms the rampart-squares of steel,
 Where in their still and stern array
 The lines of patient veterans kneel;
 The ravine echoes with dismay,
 Darkness obscures the dreadful fray,
 Despair's instinctive, maniac power
 Has madden'd men unknown to cover—
 Urged by the war fiend's fiercest sound
 The Stygian crowds infuriate pour,
 Till the last bridge with crash profound
 Goes down—the gurgling waters close;
 While o'er the tempest's midnight roar,
 And the wide strife of desperate foes,
 The deep death groans of thousands rose.

Morn dawns upon the freezing wave,

Gorged with the corpses of the brave.
 Vast darkening flights of birds of prey
 Are shrieking o'er the scene by day,
 And when the star of milder beam
 Again has lit that fatal stream,
 Gaunt groups of wolves are fiercely prowling,
 Round the abandon'd soldier there,
 And like infernal demons howling
 'Mid desolation and despair.

'Tis o'er—some lonely willows weep,
 Far in a sterile wave-worn isle,
 O'er him whose dreaded legions sleep
 From frozen Moskwa to the Nile.

They've borne him from his island grave
 Back to the smiling shores of France.

* * * * *

According to Allison's history of Europe, of 480,000 men who crossed the Niemen, only 42,000 recrossed on the retreat. And we have seen it estimated that not more than 30,000, one in sixteen, reached their homes; and many of these with constitutions irreparably injured by the hardships which they had endured.

Of the 450,000 who died on that awful retreat, 30,000 men perished in the passage of the Beresina. Battles are wholesale butcheries, yet there is something imposing in these immensely destructive conflicts. They fill a prominent chapter in history.

But let us separate this unequalled army again into the individual men whom we had seen three short months before leaving the homes of their youth amid the cultured hills and hamlets of Europe. Of these thousands met instant and comparatively merciful deaths, amid the tempests of cannon shot and clouds of musquetry that hurtled the bloody field of the Borodino, and an hundred other less important bat-

ties which were classed as skirmishes in the bulletins of the "grand army"—tens of thousands thickly scattered upon the snow over those broad battle fields, wounded, not mortally, lingered without surgical aid and without food till death terminated their sufferings—tens of thousands perished in the freezing current of the Beresina—hundreds packed in hospitals, destitute of the means of cure and of subsistence, pined into raving maniacs—hundreds of thousands benumbed with cold, and enfeebled by starvation, slumbered "*en bivouac*" upon the snow, but woke not again.

Thus died the plighted lovers—the husbands—the sons—of the bereft, the widowed, the aged; and the heartfelt mourning of hundred of thousands of lonely women, and of millions of unprotected orphans, rose up from the desolated cottages of Europe! Desolation! desolation of the heart! Let your poets who sing the achievements of military heroes and of war's proud pageants, forget not the unnumbered widows and the starving orphans of this paragon of armies.

On the night of the battle of Borodino, to the soldier, wounded, uncared for, and doomed to perish, his limbs crushed by the iron hoofs of the cavalry, urged in hot desperation to the charge, was it any alleviation of his individual sufferings, that 50,000 wounded men were groaning on the field around him, and that he died on the plains of the Moscowa, a soldier of the grand army?

To recall ourselves from these discursive reflections, which are offered merely as simple illustrations from the historical panorama of Europe, let us again direct our attention to the scene beneath us. The land you observe in the ocean horizon is the western shores of the Mediterranean, the coast of Spain,—not the least remarkable of the countries of Europe, for its historical recollections, its

diversified surface, and its mineral, vegetable, and animal productions. In mineral wealth Spain is superior to most countries, and constituted, to the ancient world, its main source of supply of the precious metals. In vegetable productions, in wheat, wine and oil, it was, after the period of its subjugation by the Romans, one of the chief reliances of the empire.

The climates of the different portions of Spain are respectively subjected to great modifications, from their relations to the continent—to the Mediterranean—to the arid plains of tropical Africa, the most heated portion of the globe—as well as to those currents of the Atlantic ocean which *curve the isothermal parallels*, and modify so importantly the climates of all western and maritime Europe.

From these causes, and from its highly diversified surface and the lofty mountain barriers which protect its southern provinces from any access of the north winds, its vegetable products are unusually diversified. It produces on its northern exposures most of the vegetables of the temperate climates, and on its southern shores, many of those which belong to the somewhat warm parallels, as the lemon, the olive, the fig, and even the sugar cane.

Amid the picturesque scenery now gliding below us, you may notice the plantations of bright green verdure. There, in the valley on the left, is one. They are mulberry trees. Valencia, the province in which all these beautiful valleys are sloping to the Mediterranean, is remarkable for its silk manufactures, and at this season the entire processes, from the worms on the leaves to the finished satin, are in full activity.

On our right, rapidly speeding in the sunset light, is the lovely vale of the Ebro, the fertile and celebrated province of Arragon. One hundred miles of landscapes sweep beneath us the more elevated, beautifully mountainous topographical summits of the peninsula. Do you notice those

sheep? What immense flocks of them are speckling the green grassy slopes up to the vicinity of the glaciers. They are the celebrated Merinos—descended from sheep brought from England four centuries ago—their wool has greatly improved in this climate, and constitutes one of the chief objects of agriculture in the central districts. In summer when the grass of the valleys is parched up, they are carefully driven to these higher mountain pastures, and in winter are withdrawn to the warmest and most sheltered valleys, thus performing a sort of migration, and avoiding the severer contrasts of the seasons.

The horses of Spain are descended from the Arabian, and those of Andalusia are among the finest in the world.

Beneath us are the sources of the Tagus. The mountain streamlets are descending to the Atlantic. Before us, the extreme horizon opens into the vast central plain of Castile—where, embosomed amid towns, villages, and a splendid scene of agricultural wealth and fertility, are the spires of Madrid, the capital, the home of Ferdinand and Isabella, the patrons of Columbus.

We have already said Spain has many historical recollections. But they have been chronicled by able pens. Ours is but a bird's-eye evening view of her noble cities and villas, of her vineyards, and gardens smiling with fruits and flowers,—of her exuberant valleys, and her mountain pastures surmounted by eternal glaciers.

As a race, the Spaniards are brave, social, polite—their character, at some periods of their national existence, has been formed upon high principles of honor; but living in an exuberant climate, they are less industrious and intellectual than their European neighbors, the French, the Germans, or the English, and they have produced few men of the highest genius. In common with the Italians and the natives of the southern portions of the intellectual zone, they have a remarkable taste for music and the fine

arts. But Spain is at present degenerate. Civil wars have wasted her substance, and now almost jeopard her national existence.

On the north, from the plains of Castile, descends the noble valley of the Tagus, meeting the Atlantic at Lisbon; on the south, the picturesque and populous vale of the Guadalquivir, reaching the Atlantic at Cadiz.

Our subject, the contemplation of the earth as the home of the whole family of man as he is actually existing, from the sunny equator to the arctic ice, is inexhaustible. Even if our ability were more adequate to do justice to it, the limits of a little volume are too narrow to do more than present a few general outlines and strong points of so vast a picture.

We have noticed myriads of rural landscapes; let us unroof the cities of the earth and study the artificial modes in which the thought-gifted social animal congregates. By a comprehensive observation of man as he actually exists in all nations, and in all latitudes, we may learn to sympathize with him in every condition in which he can be placed, and thus become familiar with all the various inconveniences and frailties, whether physical or moral, to which he is exposed, while the proximate perfection of the most favored individuals may instruct us in the best mode of increasing the intelligence and happiness of the species, and of achieving the high destinies of which the race is capable. I hope that we shall acquire, during our twenty-four hours' survey, some renewed philanthropy, and some increased consciousness of the value and capacities of our intellectual being.

We have already remarked that the middle portions of the temperate zones appear to have been the birthplace of those races which have been the great actors on the arena of the nations, and that the conquerors, colonizers and civilizers of the barbarian universe do not appear in any

instance to have emerged from either high northern or equinoctial latitudes. This is evident, whether we study on the earth's surface the localities of the dilapidated monuments of the older nations of Asia, where the human race appears to have first achieved the organization of immense empires, or turn to the recorded history of the ancient nations during the eras of the Greek and Roman dominion, or trace the intricate annals of the various irruptions, conquests, colonies, and amalgamations of the various savage hordes, the Scythian, the Turk, and the Tartar from North Eastern Asia beyond the Caspian—the Goths and Vandals from Scandinavia and the Baltic—and the Arab Ishmaelite from the Desert, who struggled on the varied arena of Western Europe during the middle ages, who have alternately trodden down the nations, and, as conquerors or conquered, have constituted links of existence in the widely interwoven genealogy of the nations—the soldiers of Attila, of Theodoric, of Charlemagne, and of Napoleon, were all nurtured in temperate climates.

The different influences of climate and local circumstances may be profitably studied in connection with the various colonies of the nations, and their results on the civilization of the colonists from the earliest Greek colonies in Italy to those of the Roman Empire—of the Goths and Scandinavians of Northern and North Eastern Europe in the middle ages, and of the modern English Anglo-Saxons, on some portion of whose colonies, in both hemispheres, the sunlight “never sets,” or, more properly, is always shining.

The ancestry of Europe, like that of the Roman republic and the older nations, comprises so many tribes of barbarian adventurers, that the student of genealogy is inevitably bewildered, and the results of research are satisfactory only in some approximation to fact.

Figures will aid us to demonstrate the difficulty of the study of genealogy. Suppose the human race, originating

according to the Mosaic scriptures from a single pair, to have doubled its numbers in every generation, in the geometrical ratio of 2, 4, 8, 16, it would take less than 29 generations to increase beyond the present estimated numbers—1,000,000,000. If you estimate the Platonic generation of 33 years, this would take place in fewer than 1000 years. One man existing 1000 years ago might have been the ancestor of all the human race now living. And by the reverse of this position, one man now living might have 2 parents, 4 grand-parents, 8 great-grand parents, &c., and 1,000,000,000 of parents, 29 generations ago. Accordingly it is very probable, such have been the constant struggles and alternate fortunes of the contending races, that many individuals now living are descendants not only of Achilles, of Eneas, of Augustus, of Attila, of Theodoric, of Mahomet, but may include among their ancestors Constantine, Solyman, Alexander, Herodotus, Hercules, Homer, Hannibal, Charlemagne, and other distinguished names of antiquity—for any of those may have been ancestor to hundreds of millions.

The ancestral history of the inhabitants of the British islands, the various invasions and colonies of the Gauls, the Romans, the Angles and Saxons, (whence the name Anglo-Saxon,)—the Danes and the Normans, and their intermarriages with the original Britons, may constitute a preparatory lesson to the student of the genealogy of the human race.

The royal sovereigns of England illustrate the same diverse origin, being successively of French, Welsh, Scotch, and Saxon families variously intermarried.

It is probable that the present superior qualities of the more energetic races, are no other than an inheritance from an ancestry nurtured in a temperate climate—as the race of the Durham ox, long nourished in the rich pastures of Britain, has acquired extraordinary qualities, and as the

American pippin is an immense improvement by culture from the same stock as the crab-apple of the forest.

It is true that the more energetic races may not always be regarded as less cruel or ambitious or blood thirsty than the inferior races, that they often abuse power and prerogative, and that the culture of the moral qualities does not necessarily keep pace with high civilization.

The fact that less than 40,000 Englishmen are capable of holding in subjection, obedience, and tribute, 150 millions of the natives of tropical Asia, though it has been for the most part accomplished by means disgraceful to England's moral characteristics, is conclusive evidence that, in practice, physical and intellectual superiority determines in a great degree the ascendancy of nations.

The hereditary influence of national character, and its permanency or otherwise when transplanted and mingled under various conditions and climates, may be comprehensively and profitably studied in the history of the various European colonies in America. The effects of the various climates and parallels of latitude, which in their successive emigrations, since the sanguine and intrepid Columbus, they have happened to select of the broad expanse before them—and the results of these reciprocal and combined influences on subsequent generations, are capable of shedding much light on the adventurous infancy and maturer character of the rudiments of nations.

In our own country the modifying effects of climate, and various local circumstances on the destiny of a race, may be studied in the character and fortunes of European emigration to North America. The present conditions of Massachusetts, of New York, of Pennsylvania, of Maryland, of Virginia, of the Carolinas, and the more western States of the valley of the Mississippi, are all largely different, and all is doubtless a result, in part, of the character and institutions of the original emigrants, and in part of the

local influences of the land of their adoption. The severe puritanism of Jonathan Edwards, the energy of Captain Hudson and the sturdy Dutchmen of New Amsterdam, the pacific and tolerant philosophy of William Penn, the liberal catholicism of Lord Baltimore, the rare chivalry of Sir Walter Raleigh, have all exerted important influences on the honest and industrious German, the sanguine warm-hearted Irish, the self-confident English, the shrewd Scotch, the gallant and excitable French, who, scattering themselves over a broad zone of climate from the Atlantic shores to the undefined West, have intermingled in *one vast republic*, whose prospective destinies, as time rolls them from the scroll of the future, are teeming with results of inestimable importance to the whole human race.

The character of the original emigrants, greatly modified, doubtless, by various facts of their colonial condition, will always in some degree influence the sons of the Puritans in New England, of the Dutch at New York, and the Quakers and Germans in Pennsylvania—and amid all the inter-alliances of their transatlantic destiny, the general characteristics of each existing individual are probably to be traced to his actual descent in the herd-book of the nations.

Let us assume a high elevation, and look down upon the topography of Europe. Let us map out its shores from Gibraltar to the Arctic, and to Constantinople. Let us contemplate its rivers falling from their mountain sources to the ocean.

Let us take a still wider view, and contemplate the whole Atlantic as one vast basin, and all its tributary streams from the summits of the Rocky Mountains and the Andes on the one side, to the furthest sources of the Rhine, the Danube, the Wolga, the Niger, and the Nile, tumbling from the glacier-pinnacles of Europe and of Africa.

Let us contemplate the evaporation, as varied by the

changes of the seasons, over this vast surface—the condensation of clouds and storms and showers, which sustain all these majestic rivers, at the eternal fountains of their furthest sources, and their incessant flow along their thousand valleys to their ocean reservoir.

As Niagara and its tributaries constitute an interesting portion of this grand subject, the following lines may not be inappropriate.

THE CATARACT OF NIAGARA.

Unrivalled wonder of the western world,
Alike the painter's, and the minstrel's power,
Aspire vainly when they grasp at thee.

Chaos of waters! in whose mighty mass
Hundreds of rivers undistinguished roll
From the wide bosom of Columbia's woods,
Their destined tribute to the ocean's surge.

Nature's eternal, universal law,
That guides the planets in their trackless course,
Equal and constant through the fields of space,
That heaves old ocean on his rocky shores
And tends the floating feather to the ground,
Calls thy wild torrents from their mountain-home,—

From trackless solitudes that stretch sublime
Beyond Superior's sky-encircled shore,
Where, 'neath the fir-tree's deep continuous shade
Primeval twilight holds her silent reign,
And echo listens as the moose-deer bounds
Calmly and fearless o'er his native steeps,—

From where the vastness of the central plain
Mingles its verdure with the azure skies
That bound th' horizon and the bison's range,—

From ravines echoing with th' Algonquin's whoop,
And lakes that ripple with his birch canoe,
Till Tonawanda adds its tranquil wave
To the full volume of the torrent's flood.

Rapid and silent as the lapse of time,
 Wild as tornado of the southern skies,
 Dread as eternity's o'erwhelming tide,
 With swelling impulse to the giddy verge
 The pauseless waters roll resistless on !

Like glaciers nurtured on the Alpine heights,
 Rushing impetuous on the mountain's vale,
 Or pillared waters ! from the ocean's sky
 When the cloud-reservoirs of heaven return,—
 The azure columns of Lake Erie's wave
 In watery avalanche continuous burst,
 Crashing tremendous in the gulf below.

Thunders that heed not to the trump of heaven
 Quiver incessant to the horizon's bound,
 And earth's deep strata vibrate to the roar.

From shrouded tumult o'er the dark abyss
 Mid rocks abrupted from the heights above,
 The shivering ruins of the waters merge,
 White as the driftings of the wintry wind ;
 While cloudy volumes of escaping spray
 Rising on whirlwinds from the trembling scene
 Reflect the sunbeams in the rainbow's hues,
 And gently shower o'er the leeward grove.

With minor thunders down its chasm-bed,
 Worn by its fury in a waste of years,
 The mighty torrent soon resumes its course,
 Where high along the fearful summits hung
 Obliquely-pendant o'er the rapids' rage,
 The giant cedars stretch their verdant boughs,
 Waving like mosses o'er the embattled steeps,
 (The favorite eyrie of Columbia's bird,)
 Until emerging on Ontario's plain
 The restless waters tranquilly subside
 In the calm bosom of the limpid lake.

O'er the broad ocean's blue and billowy wave
 The ambient vapors climb the upper air,

To float in "fleeces" on the southern breeze,
 Reflect the splendor of the setting sun
 O'er the wide scenery of the rolling world,
 And kindle pleasure in unnumbered eyes—
 Or in the storm-cloud of the northern blast
 Far o'er a world of grateful flowers, diffuse
 Their pearly moisture, till the thirsty soil
 Bids all creation vegetate and live.

Of summer's shower or of winter's storm,
 Whate'er of sustenance the verdure spares,
 Throughout the limits of earth's far domain,
 The fissured rock or pervious soil receives,—
 Or higher hovering round the empyrean peaks
 The vapory tribute joins the eternal snow—
 While from the mountain's side or hillock's base,
 Earth's myriad rivers at their fountains burst,
 And with the confluence of their kindred rills,
 Adown some ravine's deep and devious course
 Urge back their journey to the briny wave.

The extent, and entire connected scenery of the blue and boundless convex of ocean—its continuity from the poles to the sunny equator, its various and incomputably numerous inhabitants—form a field of contemplation in detail and in generalization worthy of profound and careful study.

Among these are the myriads of fishes and shell-fishes, the mighty whale, the rainbow-tinted dolphin, the porpoise, the timid flying fish, the fierce shark, and all the carnivorous devourers of the vegetable-eating fishes which are everywhere sporting among the ocean plants, of innumerable species, which grow on the shoals and shores, or form vast pastures in the depths of the waters.

The sea is a receptacle for the spoils of the earth. "Every year one-twentieth of quadrupeds, one-tenth of birds, and nearly a whole generation of insects perish." The rains carry down a part of all these spoils to the rivu-

lets, and with a portion of the annual decay of vegetation, and the more soluble soil of the hills, they compose the rich alluvion which gives so great fruitfulness to the lower valleys and deltas of rivers. A large portion of this alluvion pours itself into the adjacent tracts of ocean, giving fertility to its depths, where sub-aqueous plants grow in corresponding luxuriance. On the shores and estuaries of ocean, accordingly, Nature assembles those very various genera of animals, quadrupeds and molusca and crustacea—and fish-eating and graminivorous birds, gulls and crows and albatrosses, vultures and eagles and flamingoes, and “all those winged multitudes which subsist by the bounty of this vast liquid magazine of Nature.”

The fecundity of ocean, everywhere great, seems to be scarcely less remarkable in the frigid seas of the north than under the tropics. It has been long believed, that the vast shoals of herring and cod and mackerel migrate from the north, and take their annual departure from amid the icebergs of the arctic ocean. According to Anderson's *History of Commerce*, the shoal of herrings which appears every spring in the Northern Atlantic, crowding upon each other throughout vast tracts of ocean, divides upon the coast of Iceland, one column bearing abundance to the seas of Europe, the other following the American shores. Whales and carnivorous fishes, and innumerable multitudes of sea fowls accompany their migration, devouring immense numbers. During the season, which is for two months succeeding the opening of spring, the herring fisheries of Europe alone have for ages employed half a million of men, who pour out from the ports in an immense fleet of boats and large vessels; and it is said that enough might be taken to feed all the inhabitants of Europe. No perceptible impression seems to be made on the number of these fishes, feasted upon as they are by all sorts of devourers.

It is most probable that these vast shoals of fishes are not very extensively migratory, but spend the winter in appropriate feeding grounds in the depths of the ocean, perhaps at latitudes nearly parallel to those at which with the return of spring they make their appearance on the shores. The herring, the salmon, the shad, and other fishes, are known to climb for hundreds of leagues the descending current of American rivers, encountering all the way numerous nets spread by man to the mountain rivulets, where they spawn with a fecundity adequate to repair the annual destruction of the species—the young ones returning to the ocean in July and August—and it is probable that like the birds they return to their own native streamlets in succeeding summers.

Let us complete our picture—let us contemplate the sun-lit and stormy ocean, as the vast reservoir of the rivers, chequered with the clouds of the hour—as the wide world of convex waters, where in all time the whales and fishes and shell-fishes have sported.

Let us now call up its historical recollections—the scenes of the expeditions of the earliest navigators—the old localities of commercial opulence, Argos, and Tyre, and Venice, the traffic-built cities of antiquity.

“Thy shores are empires, changed in all save thee—
 Assyria, Greece, Rome, Carthage, what are they?
 Thy waters wasted them while they were free,
 And many a tyrant since; their shores obey
 The stranger, slave, or savage; their decay
 Has dried up realms to deserts:—not so thou,
 Unchangeable save to thy wild waves' play—
 Time writes no wrinkle on thine azure brow—
 Such as Creation's dawn beheld, thou rollest now.”

Let us contemplate the ocean as the broad highway of commerce, as it exists at this moment. Let us contemplate the mighty marts of modern traffic, and the innumerable

merchant ships of every nation, and of every style of naval architecture, as in actual service below us, veering upon every sea and bearing the proud flags and various products of all countries to every port of the earth.

Let us notice in sufficient detail the actual exchanges of the commodities of all countries. The American merchant is exporting to China the root of a plant which is gathered in the shady forests of the interior. Let us observe it! It is called ginseng, which is sold at Canton, and the dried leaves of a plant called tea are taken in return—these articles are collected, packed, exported, and distributed to the consumers over both countries. The Chinaman while he is picking the tea leaves is chewing ginseng, while at the antipode side of the earth the collector of ginseng in the North American forests returns at evening to his log-built cabin to enjoy the refreshment of the far-fetched beverage of the East.

Below us is sunset, on the broad and breezy Atlantic. In three hours we shall reach the starting point of our survey—the Hall of Independence of Philadelphia.

We are over the great thoroughfare of the great commercial nations. What are those yonder? They are sails in the distance. There is quite a number on the horizon.

There is sweeping under us a succession of ocean scenery, enlivened with the actual commerce of the hour, sometimes forming beautiful groups, where you may study to great advantage the comparative naval architecture and equipments, and nautical science, and the commercial and naval marine of the nations characterized by their respective flags. At other times not a single sail is visible on the billowy expanse, and the sense of loneliness deeply impresses us.

Gliding above, us accompanying the ocean landscape below, constantly varying groups of clouds, rich in the tints

of gorgeous summer, are floating, sometimes reminding us of these beautiful lines—

“ While, far above these rifted clouds are seen,
 In a remoter sky and more serene,
 Others, detached in ranges through the air,
 Spotless as snow, and countless as they're fair,
 Stretching immensely wide from east to west,
 A beauteous semblance of a flock at rest :
 These, as they pass along, aloud proclaim
 The great Creator's everlasting name.”

The currents and tides of the ocean, their causes, and their diverse effects on the ocean temperatures, the meteorology of the ocean, and the climates of the respective shores, are subjects of great interest to general science, and of the highest practical utility to navigation. Although many facts are known and made available, yet they have not yet been treated of, in sufficient combination, and, were our present design capable of such an extension, should properly form the subject of a distinct chapter.

We will devote a single paragraph, only, to the subject in connection with the Gulf Stream, the most remarkable current of the Atlantic.

The distribution of marine plants and animals, in like manner with terrestrial plants and animals, is found as a general rule to be determined by the angle of the sun's light, their proximity to, or remoteness from, the Equator. Thus the vast and exceedingly beautiful and various family of the corals, are found only within the tropics. There is, however, one remarkable exception. It is where the Gulf Stream, issuing from the straits of Florida, and pouring northward from within the tropical zone of the Atlantic, bears with it, (is in fact composed of) a broad mass of the ocean waters heated under the vertical sun of the Torrid Zone. The coral insect naturally avails itself of this extension of its favorite temperatures, follows the current

of warm waters, and builds in the gulf 500 miles northward of its appropriate latitudes. This fact was I believe first stated by Sir Charles Darwin.

The Gulf Stream as it issues from the Straits of Florida, says Lieut. Maury, is of a dark indigo blue color, in strong contrast to the roily green waters of the Atlantic; its maximum velocity he assumes at five miles an hour; its course, corresponding to the general curvature of the American shore, lies at the distance of about 140 to 340 miles from the coast, a cold counter current of northern waters intervening. Capt. Livingston has determined that the mass of the waters of the gulf exceeds more than 3000 times the volume discharged by the Mississippi; its highest temperature, Lieut. Maury states at 86° , and that in flowing ten degrees of latitude north it loses but 2° of temperature. The line of distinction is plainly seen for hundreds of miles; and long after the stream has spread itself out for thousands of miles over the cold waters, when this line is lost to the eye, it is still strongly marked by the thermometer. In its course northward, the Gulf Stream, after passing the fortieth degree of north latitude, encounters a cold current, which originating within the Arctic circle, is incessantly pouring down along the coast of Labrador on the banks of Newfoundland. This northern current is studded in spring and early summer with a numerous fleet of enormous icebergs, some of which rise to the height of 200 feet out of the water. By this counteracting current the course of the Gulf Stream is bent to a direction nearly due east. It spreads over a wider surface and flowing more slowly towards the coasts of Europe, at length reaches the British Islands. By these it is divided, one portion of it eddying into the bay of Biscay,—the other passing northward, covers the whole Eastern Atlantic with a mantle of warmth, mitigating in all Europe the rigors of winter,—drifting the coconuts, palm-leaves, and relics of tropical vegetation on the

coasts of England and Scotland and Norway, and pouring into the Arctic ocean renders that portion of the Polar seas penetrable even to Spitzbergen.

It is obvious that, even in a wash-basin, a current in one direction cannot exist without a counter current, and the already observed facts demonstrate a reciprocity of tropical and polar currents. While large portions of the tropical ocean are constantly rushing toward the poles, to moderate the climates of the higher latitudes, to maintain the fluidity of the Arctic ocean, and to limit the encroachments of the Polar ice-cliffs,—other hyperborean currents, often picturesque with icebergs, are steadily hastening toward the tropics, to temper the intense heat, and impart a grateful coolness to all nature, panting under the fervid heat of the vertical sun ;—midway of the Atlantic, in the centre of the scene we are contemplating, between the Azores, the Canaries, and Cape de Verd islands, is a triangular space equal in extent to the Mississippi Valley. This is called the Largasso sea. It is an immense pool, the focus of the various currents we have so hastily alluded to. Here are gathered in great quantities gulf weed, drift-wood, wrecks, and all the floating substances cast upon the Atlantic waters from the Indian ocean by the Lagullas current—from the frozen regions beyond Cape Horn, borne by the ice-bearing current from the Antarctic seas—and from the Arctic ocean by the Labrador current.

Here centre the moss and lichen of the extreme North, brought down to the Grand bank ; the larch and the fir of the furthest South, conveyed also by the ice-bearing currents from Cape Horn ; and the drift-wood of the upper waters of the Mississippi from the Gulf of Mexico, marked with the axe of the woodman of the Ohio, the Alleghany, or the furthest Missouri.

These counter currents are doubtless productive, in the economy of nature, of very important and very numerous

local effects. They are also obviously productive of general effects of the most indispensable utility. They modify the climates of the opposite shores of the Atlantic and Pacific, bending respectively the lines of equal temperature, which the Baron Humboldt has marked on his maps of isothermal parallels.

These variations, inconsiderable within the tropics, are greatest at those points where these contrasted currents of the Arctic and Equatorial ocean are invading the temperate zones. These currents are distributed in the ocean perhaps in a manner very slightly analogous to that of the arterial and venous system of the blood in animals, so as to affect the aggregate masses of the arctic and equatorial waters.

The southern currents flowing to the north, constantly carry with them immense shoals of fishes, medusæ, and numberless marine animalcules, nurtured in the rich pastures of the tropical oceans,—which are chilled in the colder waters, and thus furnish a rich supply of food to the fishes and sea-fowls of the north, while it is exceedingly probable that the regular influx of the cooler waters is indispensable to the healthfulness of the tropical oceans: without it they would probably soon become putrid.

It is obvious that a comprehensive view of these currents is an important element in the consideration of the evaporations and meteorological phenomena of the ocean—and of every fact in the migratory habits of the fishes in the warmer or the cooler waters. Thus the spermaceti whale is a tropical animal, and is found only in the warmer waters, while various other species are found exclusively in the cold waters of the north.

But we must despatch this interesting subject hastily. It is but a small item in our view of the earth.

The land you may now notice, at first sight so uninteresting, is the low sandy beaches and salt meadows of New

Jersey at the fortieth degree of latitude. A rather barren shore, inhabited by a few fishermen, herons, and water birds—the cornfields and humble cottages of the farmers—a forest where the wood cutters and charcoal men are at work—glide swiftly by. Beyond them a rapid succession of agricultural scenery is beneath us.

Do you notice those spires in the distance? They ascend from the temples of the city of Philadelphia! The village below us is Camden, New Jersey, on the east side of the Delaware river.

Beyond the river is the broad front of the city. Yonder is the cupola of the Hall of Independence, whence we started.

I am very glad you are safe home—good-bye.

CHAPTER VII.

The Earth's Annual Motion in its orbit round the Sun, causing the Seasons.

The preceding chapter is an attempt to illustrate the actual daily revolution of our globe, in the progress of that unchangeable course which the great Regulator of the universe has allotted to it; a revolution which exposes to the sun's vivifying influence its whole surface, and affords the blessings of light and heat to the whole animal and vegetable creation, and to a thousand millions of rational beings.

Our earth, with its whole animal and vegetable creation, with its thousand millions of our fellow creatures, contemporaneous sharers of this wonderful terrestrial existence, is really rolling under us, and light and shadow are chasing

each other on our revolving planet as they have done unceasingly, during the untold centuries of all previous time. On the one side where the dark hemisphere is turning to the sun, as it rolls into the sun's light, over a meridian extending from one icy pole across the entire temperate and tropical zones, to the other icy pole, the bright and roseate tints of dawn are at this instant advancing over the scenery, all blooming with flowers, and joyous with the song of early birds. The proud eagle is waking in the mountain forest; the snow-white swan on the estuaries of ocean perceives the dawn and awakes his fellows; the condor soars upward from the peaks of the Andes; the swallow twitters beneath the humble roof of the peasant and the architrave of the sleepy citizen. Man, too, the whole family of man, awakes to the consciousness, the cares, the happiness of existence; the laborious to their toil, the thoughtful to their reflections, the happy to gratitude and joy, the sorrowful to sadness and invocation.

The husbandman, while all the plants are yet glittering with dew-drops, is resuming the first and best employment of man. The mariner awakes to the blue and boundless horizon of the ocean, and climbs the topmast shrouds, musing on the cherished recollections of his native village; the morning gun booms, and the soul-stirring reveille awakes the soldier to the excitements and privations of his profession, to the proud recollections and heart-wasting horrors of battle. All awake, the hermit to his solitude, the courtier to his intrigues, the hunter to the chase, the artisan to his labor.

The whole earth, teeming with all its inhabitants, rolls to-day into the broad sunlight, and again into the sunset scenery and into starlight. It did so yesterday, it has done so from time immemorial. One day, with all its occupations and all its events for good or for evil in the destinies of empires and of individuals, thus irrevocably passes. Even while we are observing, exhaustless nature, in accordance with the

grand rotation of the planet, is advancing one day the progressive maturity of the seasons. Amid "scenes of the bridal and the bier," the pomp and circumstance of ambition and of war, amid the tranquillity of rural life, the solitary seclusion of the wilderness, on the mountain wave, amid the bustle of cities, the clangor of the battle-field, the excitement of the forum, or the delights of pastoral love, to the *thinking* and the *thoughtless*, the *savage*, and the *civilized*, the misanthrope, and the student of nature, one day has passed, and whether well or ill spent, each of the millions of our cotemporaries has advanced one day in the autobiography of existence and the accountabilities of human actors.

"The clock strikes one;
We take no note of time, but from its loss:
• To give it then a tongue were wise in man."

Let us now study with undivided attention the vivid picturesque reality which constitutes a year. Our little magnificent earth continues to roll on, again and again round, with the same pauseless, sublime, silent motion, completing day after day to the life of mortals, bearing every succeeding day its northern hemisphere into the less and less direct radiance of the sun's rays, and bringing with every day the glorious progress of the seasons toward the autumnal equinox. Every day perfects its share of the innumerable blossoms of gorgeous summer, and brings forward, in succession, the fruits and harvests of exuberant nature. The "all beholding sun" sheds his genial influence upon the broad earth: the smallest desert flower, and the winged plunderer that sips its sweets, awake and flourish in the warm, benignant, impartial light of heaven, as the wide and varied face of the rolling planet presents itself in inconceivable vastness and beauty to the star of day.

The picture of a year comprises the entire course of the

seasons, contemplating, in connection with all the phenomena of the earth's daily revolution on its own axis, as indicated by the rising and setting of the sun, and which our last chapter is but an attempt to describe, its great annual revolution measured by its immense orbit round the sun, the common centre of its kindred planets.

This vast annual circumvolution of the earth six hundred millions of miles through space, occupies the time of about three hundred and sixty-five days, or rotations on its own axis. In other words, its progress through space, is one and a half millions of miles per day—it sweeps one and a half millions of miles in its orbit during each daily revolution on its axis.

Owing to the obliquity of its axis to the plane of its path in its orbit, it presents during its circular course in the heavens, for six months through the southern portion of its orbit, half round the Zodiac, from the constellation Aries, to the constellation Libra, the Northern side of the revolving orb to the more vertical and direct rays of the Sun, constituting the Summer of the Northern Hemisphere, and then for the other six months of its course through the Northern portion of its orbit, from Libra to Aries, it inclines the northern side into more oblique and less intense sunlight, bringing on the Autumn of the Northern Hemisphere, and simultaneously increasing the Sun's influence on the Southern side of the earth, vanquishes the winter's antarctic accumulations, and causes, with corresponding progress, the spring of the Southern Hemisphere.

Every day brings with it the progress of earth's opening flowers. What botanist can hope to register the floral calendar of the garden of the universe? The budding of the old forests, the ripening of the harvests, the wheat and maize fields of North America and Europe, roll every day round with us, one day riper than the last: and not alone in the cornucopia of summer's bounty are the

wheat and maize harvests; the vine clusters of the winding Rhine, the olive groves of Italy, the heavy vintage of Turkey and Asia, the sugar-cane of the sunny Indies, are all ripening; the American school-boy watches, with lively interest, the reddening cherry and the blushing apple, growing every day riper in the same benignant sunlight that matures with impartial kindness the rich figs and luscious vintage of populous Asia.

Over the whole earth, the genial summer forgets not to wake every variety of vegetation; every one of more than a hundred thousand species of plants, perfects its seed, securing its perpetuity and furnishing to the animal creation the various food adapted to their sustenance. The chestnut ripens, in Southern Europe, food for the peasant; the nuts of the vast American forests are all matured in their season for the bears and multitudes of raccoons and squirrels, and the clouds of passenger-pigeons, which are there to feed, where God's bounty fed their tribes from time immemorial. The entire loves and parental attributes of the creation, the maturity of every plant, the winter clothing of every individual animal, progress with the course of the seasons, till the frosts of autumn blight "the Aster and the Golden-rod" of the American woodlands; the song-birds migrate toward the tropics, and the glorious foliage of the declining year brightens the entire northern convex of the globe, and the pageants of the harvest moon, and the horns of earth's jocund huntsmen, echo among the hills.

The grand spectacle of the autumnal foliage corresponding to the retiring sunlight, and first invasion of frost upon the summer scenery, displays itself in surpassing beauty upon the broad forests of the Temperate Zone. In the American woods, the dark green of the oak changes into crimson, and golden-brown and scarlet; the walnuts fade into the tints of the lemon and the orange; the eme-

rald of the maples and gum trees blends into yellow and rose color ; the dogwood darkens into purple, and the many-tinted wilderness of forest is painted up for a fortnight in colors gay as an infant's picture-book, and delicate beyond the power of art.

Toward the more northern parallels, over the crowded forests of a thousand mountains, the golden and roseate foliage of autumn mingles in brilliant groupings with the deep dark green of the family of the fir trees which embosom the silver lakes of the north.

In the mean time the frosty breath of approaching winter blights by successive invasions the lovely array of the autumn flowers. But the consummations of the season have been accomplished, the shocks of corn have ripened, and the whole cornucopia of autumn, the innumerable fruits, and golden harvests of countless myriads of vegetable existence, have fulfilled the purpose and the destiny of their species.

The trees of the wide forests, and the flowers "born to blush unseen" in the desert, have each perfected their seed, and secured the continuation of their species. The topmost branches of earth's orchards, that but lately as the sunlight advanced upon their latitude put forth their exuberant blossoms to the vernal breeze, have been during the bright and genial hours of summer the scene of the song-bird's loves and parental anxieties, but the songsters have flown to a milder sky, and their nests are now left desolate among those same branches bending beneath the rich crimson and golden fruits of October, and the stormy winds of November are soon destined to scatter the loosened leaves o'er the autumnal landscape.

Succeeding soon to the autumn scenery, the winds and snows of winter, widening and widening from the realms of the eternal ices of the Arctic, extend themselves with the sun's south declination, over the fairest portion of the

Temperate Zone, and sometimes infringe upon the outposts of eternal summer, and nip with their cold blasts even the perennial verdure of the warmer latitudes—till the winter solstice is passed—silently speeding in its pathway the Zodiac, a thousand times fleetier than any steed or locomotive, the earth has swept the northern node of its orbit and is returning southwardly. The same diurnal progress now brings every day the northern landscapes into the more and more vertical sunlight, and the gradual return of spring at length triumphs over winter's frost-works; every day the field of white snow drifts, which, extending from the Pole toward the Temperate latitudes, caps the northern portion of the globe, melts at its circumference as it rolls round beneath the strengthening sunbeams, and invidious winter shrinks back before the coquetry of Flora and the zephyrs, to its impregnable fortresses at the Pole.

The upspringing of the innumerable flowers, the blossoming of the orchards and forests, the songs and nest buildings of earth's seven thousand species of birds, progress simultaneously with the unlocking of the rivers. The successive freshets of the tributaries of the Mississippi, and the time honored irrigations of the old Nile, once more reach their respective estuaries, as in former ages about the summer solstice, at the time when the sun enters Cancer.

In this grand revival from the lethargy of winter, the whole animal creation, down to the reptiles and the lowest forms of animal life, participates. The tortoises of the ocean, the fishes of the lakes, the innumerable insect tribes, the medusæ and the infusoria, all obey the impulse of the brightening sunlight on the scene around them. Even the night wanderers, the owl and the bat, experience in their dark retreats the certain return of the seasons. In the lately frozen marshes, the frogs of whole parallels of latitude wake up successively, shuffle out of the mud

and begin to croak every day louder and nearer to the Pole.

The chemical forces, inoperative during the colder temperatures, regain with the increasing heat their suspended activity. The faded growth of last year's vegetation, which covers the earth as with a mantle, and which had remained during winter nearly unchanged, is now suddenly acted upon by those warmer temperatures which originate and promote decomposition and decay, while at the same time the chemico-vital influence of heat awakens the embryo seeds, and brings into quick and simultaneous existence the food and the million mouths of infant vegetation. The frosts of winter have produced a mechanical disintegration, and the vegetable salts, the carbonic acid, the alkalies, and the gases, which the decaying vegetation of previous years gives to the water and the air, are now rapidly appropriated to new organization.

It is worthy of remark here, that the well known axiom in chemistry, that the presence of heat, air, and moisture, is essential to chemical action, appears to be equally true in vegetable chemistry ; thus, in great droughts, the growth of vegetables, and the preparation of their food in the grand laboratory of Nature, are perhaps equally suspended. In the spring, the decay of the old leaf is proportionally retarded by lingering cold, which delays the burst of the new foliage ; thus making the one wait till the other is ready ; and in dry weather, vegetation and the decay of vegetable food wait till rain occurs to give both full activity.

Professor Liebig, (fifth chapter on Organic Chemistry,) says, " carbonic acid, water and ammonia contain the elements necessary for the support of animals and vegetables. The same substances are the ultimate objects of their decay and putrefaction. All the innumerable products of vitality resume, after death, the original form from which they sprung. Thus, death, the complete dissolution of an

existing generation, becomes the source of life for a new one."

In another place it is well said by Liebig, that a plant acquires a new mouth with every leaf and every fibre of root.

It is thus that mother earth, fertilized by the returning sunlight, prepares upon her wide spread bosom the necessary food for the innumerable mouths of her vast family.

The entire world of insects, awakening from their chrysalis sleep, burst on every side the cerements which nature provides them during the night of winter, and commence their summer existence: the busy bee awakens to his labors, and the infant lord of creation chases the butterfly from blossom to blossom.

The migratory birds of both hemispheres, which, following the sun, had retreated during the colder parts of the year toward the tropic and the equator, now advance with the sun's return, amid the exuberant summer vegetation of the northern Temperate Zone.

The following stanzas describe the migration of a single species belonging to one of the most remarkable genera of passage birds.

THE BOBLINK OR BOB-LINCOLN.

[This truly migratory bird (the *Emberiza Oryzivora* of Wilson, and *Icterus Agripennis* of Bonaparte,) is called the Boblink in New England, the Reed-bird in Pennsylvania, the Rice-bird in the Carolinas, and the Butter-bird in the West Indies. It winters, says Wilson, from Mexico to the Amazon and the Equator. It breeds in New England, New York, the Canadas, and Labrador, north of the forty-second degree of north latitude; so that its annual migrations, being nearly equal to the forty-seven degrees of the sun's declination, place it in the same relation to the sun's rays at the winter as at the summer solstice. In August it descends from the hills of New England upon Pennsylvania, and especially upon the islands and shores of the Delaware river, where the seeds of the wild rice are then ripening. Here it becomes exceedingly fat, is sought after by city sportsmen, and immense numbers are killed during their short

stay. It migrates south with the first frosts of September to the rice fields of Carolina and Georgia, where it participates in the harvest of the planters. The middle of November finds it among the Guinea-grass of Cuba and Jamaica.]

Upon New Hampshire's grassy hills
 My cradle was a tussock nest,
 My lullaby the murmuring rills ;
 And there my infant dreams were blest
 With visions of June's brightest hours,
 And butter-cups and clover-flowers ;
 And there my father's simple song
 Was "happy as the day was long ;"
 I cannot tell, you cannot think,
 How bravely there he sang Boblink !
 How gay he sang "Boblink, Boblink !
 Link-link, Boblink !—Boblink, Link-link !

While yet the sunlight's strongest hour
 Shed o'er those hills its genial power,
 From day to day we nestlings grew,
 And when the mowers struck, we flew :
 Dreadful destruction came to pass
 O'er all those lovely flowers and grass ;
 And when the men and maidens came
 To spread and rake the fragrant hay,
 You would not know the scene the same ;
 Vast ruin happens in a day !
 I cannot tell, you cannot think,
 How sad my father sang Boblink !
 How mournfully he sang Boblink !

Swiftly our orb's far zodiacs run,
 That lift and lower the glorious sun,
 And soon the slow-declining light
 Fell feebly on my native height ;
 And summer's scenes and gayest flowers
 Gave place to Autumn's sober hours.
 Eternal instinct's guardian care,
 That guides the wanderers of the air,
 Called all the passage-birds away,
 Impelled us, though we longed to stay.

The warblers in their native groves,
 The web-foots by old ocean's shore,
 Rallied their little ones and loves,
 To trust the trackless air once more.

Although our native fields were bright,
 And August flowers were blooming nigh,
 Our kindred joined the general flight—
 Glad pilgrims to a warmer sky;
 We knew that nature's harvests there
 Were spread for every bird of air:
 On the free bounty of her store
 Trusted our sires in days of yore.
 Our beaux were not in summer dress;
 They sang their plaintive autumn notes,
 Not those the rattle-caps express
 When love incites their merry throats;
 So sad their hearts, you would not think
 They ever sang Boblink—link-link!

Bright summer ripens many a seed,
 But none more luscious than the reed
 That robes the islands and broad shores,
 Where the sea Shanunga* pours;
 Thither our countless flights repair,
 Like starlings blackening all the air.
 'T is a vast festival; the sportsmen pour
 A rolling volley on the shore;
 Falcons are there; and all-devouring man
 Feasts on fat reed birdst as on ortolan;
 Till cool September bids our millions fly
 To the warm mantle of a sunnier sky;
 Then o'er Savannah's fertile delta spread,
 The rice-plant waves its many-feeding head;
 Your Boblink-Rice-bird takes a bounteous share,
 And smooths his plumage in a genial air.

* Indian name for the Delaware river.

† The Reed-bird is allied to, but is a distinct species from, the Ortolan of Europe and Ortolan of Asia, which birds, in their simultaneous migration, are contemporaneously feeding on the rice-fields of Lombardy and of the Canton Province.

Till guardian Nature, that protects us all,
 "When heroes perish, or when sparrows fall,"
 Still bids us follow toward the southern zone,
 And make the sun's bright journey all our own.
 O'er "lands of flowers," and o'er the tropic isles
 Where all unblanched, perennial verdure smiles;
 High o'er the sea-boy through the crimson air,
 From isle to isle our myriad swarms repair;
 Where Amazon's luxuriant shores are rife,
 And earth's bright girdle teems with joyous life.
 There, while stern winter's deadliest rigors blow,
 Our native hills deep-whelmed in drifted snow,
 Your Boblink-pilgrim, till life's span is run,
 Worships and migrates with the varying sun:
 Until the day-star in his course on high
 Wheels his proud chariot in the southern sky,
 And strengthening sunlight on our native hills
 Wakes from their winter sleep the frozen rills,
 And calls the warblers from the orange groves
 To the spring scenery of their summer loves:
 We take Shanunga's meadows by the way,
 And there we'll greet you on the tenth of May:
 Our beaux and belles in summer feather;
 Our mated birds gallant and glorious,
 We'll sing for love and lovely weather,
 And make the budding groves uproarious.

We stay not; for we seek again
 Each his own native mountain glen!
 And there, when some kind bird will share
 Our fondest loves and parent care,
 Near the same spot we'll build a nest,
 Where erst our infant dreams were blest:
 And when the mower whets his scythe,
 He'll listen to the Boblink's song:
 Earth cannot boast a bird more blithe,
 When June's gay hours are bright and long.

The flight of the passage birds of the whole hemisphere corresponds to the daily advance of the sun, the resuscitation of vegetable existence, the enrobement of the

northern convex in fresh foliage, and the flowering of the whole northern herbarium.

Awakening from the dreary sleep of winter, the oaks and walnuts of the old forest once more hang their pensile epaulet-like blossoms in the breeze. Amid the blooming of earth's orchards and vineyards, the fragrance of the acacia, and the olive, the rose tree and the nutmeg, the liriodendron and the magnolia, mingle with the delicious odors of a thousand genera of delicately tinted flowers, which are melting into the air.

True to the instincts of the season, it is amid all the enchantment of renovated vegetation, that the migratory birds, like an army, occupying every longitude and many degrees of latitude, with its vast divisions; its van guard, centre and rear, composed of different species, advance by easy flights, gladdening with song and revelry the vernal scenery perhaps, to the very scenes where their ancestors have nestled for a thousand summers. The entire feathered creation, the eagle on the cliffs of the mountain, the water-fowl on the marshes of the ocean, the vulture, the owl, and the turtle dove in the hollow trunks of the old forest, the woodthrush in the glen, the nightingale in the hedges, the boblink in the meadows, the red breast in the orchard, the oriole in the avenues, the starling by the brook, the heron in the swamp-nurtured cedar, the ostrich in the sandy desert, the raven in the towering pine tree of the mountain, the swallow in the barn, the blue bird and wren in the garden, the noisy rooks on the time-revered castles of Europe, all simultaneously resume their valentines and their loves. Almost every acre of earth has its songsters. Wilson estimated that not less than four hundred millions of migratory birds enter Pennsylvania.

While innumerable warblers arrive from the south to "the summer scene of their youth and loves," in the forests and orchards, and meadows of the Temperate Zone, other

genera migrate to the Arctic circle, to meet their loves, amid the short and sunny summer of the northern latitudes.

Everywhere, all round the planet, numbers of new blossoms open with each day's advancing light, on the convex of the globe, "the time of the singing of birds has come, and the voice of the turtle is heard in the land" of the patriarchs, and in the American woodlands. The whole circle of spring scenery, and delicate and sweet blossoms, and bright and happy birds, and all spring's glorious accompaniments, gradually converge upon the North Pole, with the daily motion of the planet, until the sun of summer sheds its oblique but constantly encircling light upon the Polar scenery itself.

At each Pole, a perpetual winter has entrenched itself. The direct vertical sunlight maintains a constant summer at the Equator, and sustains the perennial vegetation of the Tropics.

The obliquity of the earth's axis to the plane of its annual orbit, before alluded to, produces in each hemisphere, alternately, an annual increase and diminution of the sun's light. With this diminution or declination of the Solar radiance, the frosts and snows alternately extend themselves from either pole toward the temperate and sunny latitudes, and all the phenomena of the seasons have thus flickered with an eternal changefulness over the Temperate Zones; an alternate succession of spring and autumn scenery, corresponding to the sun's varying altitude, is ceaselessly converging and diverging over the middle grounds, the neutralizing points, between the latitudes of eternal winter and perpetual summer.

Any given angle of the sun's meridian light, in its semi-annual advances or recessions, arrives at its meridian daily at a higher or a lower altitude, and thus describes on the earth's convex a spiral line of advancing or receding inci-

dence, corresponding to the breadth between the winter and summer solstices.

The daily increase of the sun's altitude on the one hemisphere, is in the same ratio with its decrease on the other. The earth's motion retroceding one hemisphere from the solar radiance, subjects its summer landscapes to the gradual advances of autumn, and to the frosts and snows of winter : while at the same moment it presents the landscapes of the other hemisphere to the gradual return of spring's enchanting luxuriance, and to the ripe glories of summer, and thus maintains the reciprocal vicissitudes and the unvarying eternal course of the seasons in both hemispheres.

This daily change of the sun's altitude produces a constant variation in the angle of light and shadow on the whole terrestrial scenery. The shadows of earth's forests, of its palms in the south, of its oaks in the temperate latitudes, and its firs in the north, and, in short, of every object, are daily changing their line of incidence, and an altered light is the index on the Dial of the Seasons of that altered temperature, which, in correspondence with the celestial mechanism, consummates on the omnipresent landscape of the planet the grand annual pageants of spring, summer, autumn and winter.

It will instantly occur to the practical navigator, that it is by no other than the observation of the angle of light on the Dial of the Seasons, that he is able to determine his latitude and position on the trackless ocean. The daily sunlight beaming with broad and certain radiance on the whole face of nature, on man's little monuments and dwellings, and harvest fields, on the restless ocean, on the forest leaves, the crags of earth's mountains, and on the turrets and quadrangles, and grass-grown columns of art's old memorials, streams into the old Greek, and Roman and Gothic windows, and continues to describe with the return of the seasons in the dilapidated corridors and aisles, worn

by the footsteps of oft succeeding generations, its varying angles of incidence, in conformity to the annual and diurnal rotation of the globe, as perpetually and pauselessly now, as when in long past years it traced upon them its varying parabolas of shadow, and lit their walls amid the transitory brilliancy of departed greatness, in the age of Pericles, and of Augustus, while yet the immortal Cæsars 'bode with men.

This pageant of the seasons is perpetual; the drama of rural life, as witnessed by the poets and shepherds of our race in all time, as written by Virgil in the age of Augustus, and by Thomson in his poem on the seasons, is perpetually renewed.

The labors of earth's husbandmen progress in conformity to the seed-time and harvest of their latitude, and under all political vicissitudes, the garden-cultured landscapes of Persia, and the favorite resorts of Horace, by the banks of the resounding Tiber, amid spring's renovated beauty, are still gay with the songs of the nightingale, and the love-breathing flute of confiding lovers. The instructed and observant student of nature, witnesses with unspeakable pleasure each glorious revolution of the seasons blended with innumerable youthful recollections, and in every fortune often realizes the sentiment of Bryant—

“I've tried the world—it bears no more
The coloring of romance it bore,
Yet well has nature kept the truth
She promised to my earliest youth.”

There are many misanthropes, but they are all partially insane, they are devotees to limited ideas.

If Wordsworth's remark is sound, “that he would not give a rush for any landscape that did not express the time of day, the climate and the period of the world it was meant to illustrate; because such landscapes would be un-

true to nature,"—this view of the co-existent landscapes of our earth, under the actual angles of the sun's light, commends itself especially to connoisseurs of the arts, as well as to students of nature.

The changing light indicating the varying solar heat, is constantly blazing on the Tropics and flickering upon the Temperate Zones, while toward the axes of the planet, within the Polar circles, the sun is for six months alternately above and beneath the horizon. The student of Arctic nature observes, at the approach of the vernal equinox, the dawn of his semi-annual day rolling around him with a constantly increasing brightness and giving in addition to the aurora borealis, of his northern clime, the enduring golden and rose-colored reflections of the long lost day-star, increasing in brightness till at length the disk of the sun touches the horizon, and gradually rising as it rolls around him, climbs for three months a daily spiral path in the heavens, reaching at the summer solstice an altitude of twenty-three and a half degrees, more than a fourth of the way to the zenith. It then begins to return toward the other side of the equator, and arriving every day by the same spiral revolution at a lower and lower point of the horizon, brings on the long bright evening of the Polar circle, till at length the sun again immerses itself gradually, and its reflections long lingering in a brilliant diurnal procession of one continued sunset, at length fade, while the stars appear and brighten for a long semi-annual night of winter amid the frosty flickerings of the northern light.

It is when the daily rotation of our part of the earth rolls us out of sunlight into the earth's shadow, the little cone of darkness behind it—it is when we look from within the edge of this curtain of shadow, that the reflection of the sun's light on the illumined clouds and atmosphere near the margin of nocturnal darkness gives us the splendor of

sunset and sunrising, which we have witnessed and alluded to so frequently, in this, our Drama of Nature.

We commenced our survey at sunset; we are consequently so near to the edge of the curtain of darkness that we observe all nature to more advantage under the brilliant lights and shadows of evening, than under the steady glare of day. But it is when we have rolled further into the curtain of night, and the dazzling light of our own sun is more completely enshrouded, that the feebler light reflected from the planets, and the direct light of innumerable other suns, the fixed stars of the firmament, become visible to mortals. And it was from behind this little curtain that the astrologers and astronomers of an hundred ages made those gradual discoveries, which have at length partially revealed to us the stupendous glories of illimitable space.

Before entering upon the astronomical relations of our little planet to the universe, we will once more, for a moment, ask your attention to the phenomena of light, as illustrated at the earth.

One complete hemisphere of the rolling orb receives the radiant sunlight; the other hemisphere, on the side away from the sun, is always in shade. On the one side it is rolling into, and on the opposite side rolling out of its own shadow. On both sides, therefore, at the points of sunset and sunrise, as the sun's disc approaches the apparent horizon, receding or emerging, the light falls nearly parallel with the earth's surface, and illumines a broad tract of translucent atmosphere fleckered with the clouds of the hour, whence it is reflected in innumerable tints to the eyes of millions of mortals.

The well known law of the incidence and reflection of light at similar angles, is beautifully illustrated in the phenomena of the sunset skies. The sunset light falling on the various surfaces of earth, ocean and clouds, is reflected

at very various and constantly changing angles, for the earth's rotation is pauseless. The slanting, nearly horizontal, sunbeams falling of a tranquil evening on such a mirror as the Mediterranean, where Claude's pencil has so beautifully delineated the evening landscape, are reflected upward at the angle of incidence, and reaching strata of clouds of various density and elevation, are again deflected in various tints back upon the terrestrial observer. In proportion as the reflection is brilliant, this glow upon the earth's or ocean's surface may be again repeatedly reflected, as often as the stone skips upon the water; and thus it is, probably, that those lingering, magnificently glorious twilight characterize the Mediterranean peninsulas, the shores of the American lakes, and the islands of ocean.

Those irradiant, divergent pencils of the sun's light, which occur before sunrise and after sunset, sometimes, when they are variously divided by broken rifts of clouds below the horizon, produce those beautifully striated reflections which are called the "aurora."

The atmospheric illumination, till the sun is eighteen degrees below the horizon, is thus prolonged and deflected in a thousand different pencils from the halcyon seas of the tropics—the icebergs of the arctic—the glacier summits of the Alps, the Himalaya and the Andes—the expanse of the billowy ocean, of the great lakes of the New World—the lesser lakes of Albion, the "Lacus Avernus" of classic Italy, and the bright hills and shadowy valleys of earth's sunset landscapes.

The delightful, radiant, and sunny landscapes of Claude, the solemnity of Titian, the sublimity of Rembrandt, the rich, deep coloring of Rubens and Veronese, the grandeur of Michael Angelo, the grace of Raphael, the matchless sculpture of Phidias, of Praxiteles and of Canova, are admired and venerated only in proportion to their fidelity to nature.

A gentleman, late of our city, has done honor to himself, by a most curious and interesting collection of the natural objects of China, and of the paintings, costumes, arts and manufactures of that peculiar nation of three hundred and fifty millions of people, who occupy the opposite or antipode side of our globular landscape. The design is a good one, and might be extended to other nations. We might have an Hindoo, a Russian, a Prussian, an Egyptian, a French, an English, an African, and an American museum. We might construct them on an immense scale, and collect, at great expense, menageries of their respective animals grouped in gardens furnished with their accustomed plants, and artificially assimilated to the temperature of their native climates. We might even far surpass, in the variety and extent of our groupings, the noble Garden of Plants, at Paris, and all existing collections—yet this would be but a laborious and ineffectual effort to imitate nature, we should still have but caged eagles, and tamed monkeys. Let us embrace all co-existing realities, the present and the past, the living and the dead, as landscape scenes. We shall find all existing things already grouped in the magnificent museum of universal nature.

History is nothing but a picture ; life is a picture ; poems are pictures ; Campbell's *Pleasures of Hope* is a picture of the Future : Rogers' *Pleasures of Memory* is a picture of the Past ; the coexistent reality of nature, we are endeavoring to illustrate, is but a picture of the Present ; actual life is but a living picture, a *tableau vivant*.

To the omnipresent eye of the Omniscient, (let us speak with reverence,) the convex landscape of our planet, "this little theatre of human passions and human anxieties," is a continuous drama of a thousand millions of actors. "All the world's a stage."

Phidias and Raphael, Hogarth and Vernet, Euripides and Shakspeare, are but copyists of nature.

Roget, one of the ablest of living physiologists, remarks that "the perceptions supplied by our sense of sight being at once the quickest, the most extensive and the most varied, are the fittest vehicles for the introduction of other ideas. Visual impressions are those which in infancy furnish the principal means of developing and improving the powers of the understanding; it is to this class of perceptions that the philosopher resorts for the most apt and perspicuous illustrations of his reasonings; and it is also from the same inexhaustible fountain that the poet draws his most pleasing, as well as his sublimest imagery."

If this is true,—if it is pictures which convey to our early infancy the most vivid ideas, if the language of our after years is in fact but pictures, words calling up the mental image of their respective objects—if memory treasures up for future occasions its magic pictures, the receded scenes of life's real drama; if the tragedian on the histrionic arena presents to our senses pictures condensing life's successive realities into the passing hour, if, in short, every thing not actually before our eyes is undeniably a mental picture, all human knowledge or human wisdom, even when it assumes the highest attribute of which it is capable, the evidence of cause and effect which the Creator has immutably impressed upon terrestrial objects, is found comparing pictures of the present, or searching amid the successive pictures of the past, and thus deducing whatever of foresight can be claimed for its maturest conclusions. Even the mathematician has his pictures—in his delineations of mere form and proportion, he is compelled to resort to them. The book of nature is sometimes used in a limited sense, as contrasted with revelation, but the drama of co-existent nature, and the changes which time works in it, is the great library of human wisdom, arranged for human instruction by the benignant Author of the scene and the

actors. Memory is but a sort of portfolio of pictures, which each individual carries about him.

It is in this portfolio, that we treasure the aptest lessons of our dawning intellect, and the vivid vicissitudes of our after years,—and in life's latest moments the dying peasant and the peer, the favorite of ambition and its victim, the soldier expiring amid the din of battle, the sailor foundering amid the midnight tempest, delights his last flickering consciousness with the green hills and mother tones of his early childhood. A man is said to be of powerful memory, who has an accurate and well arranged mental daguerreotype port-folio of all he has seen and known.

As the first preparation for a drama is a good and easily shifted series of stage scenes, giving appropriate perspective to the historical passages to be represented, and these being perfected, offer a suitable arena, and add incalculably to the triumphs of histrionic genius—as the attention of the reflective spectator alternately dwells on the passing pageants and sentiments illustrated, and on the magic creations of the pencilled landscapes, so we having around us, in our real drama, all the variety and brilliancy, extent and grandeur of scenery, corresponding to the entire globular landscape of our planet,—having at our instant bidding all that is sublime and beautiful in what now exists on earth, and all that was glorious and worthy of remembrance in past time, must carefully adapt our scenery to the numberless pageants in the actual picture of nature, and summon our real actors from their mouldering repose, from the “communion of the immortals,” from the resting place of heroes, to their true position in the history of the past, surrounded with all the freshness of natural scenery, with all the brilliant beauty of the changeful seasons, and all the glorious illusions, the sober realities, and instructive tragedies of history.

The disconnectedness, the rapid shifting of our scenes

and actors, which is inseparable from a drama of the earth and the heavens, is perhaps indispensable to a vivid conception of their actual coinstantaneous existence.

As the rapid shifting of the scenes in the alternate acts of his dramas enables Shakspeare to delineate, so effectively, distinct, coexistently progressing incidents of the same era—as Homer, in his matchless *Iliad*, depicts the shores of the Mediterranean, the beleaguered city, the hostile ensigns flapping from its hundred towers, the proud array and fierce encounters of his implacable heroes—coinstantaneously with the empyrean halls of the Omnipotent, where the fates of the imperial city and the impending battle vibrate amid the awful deliberations of the assembled gods—so the instant and spontaneous shifting of our scenes assists us in the preliminary effort to contemplate the earth and the heavens, as well in reference to the individual actors, as to national, cosmopolitan, and astronomical reflections, and enables us to apply the philosophy of generalization to the whole area of human research, and to accomplish such an omnipresent contemplation of whatever exists on the earth and in the universe, as will rid us, at least in part, of the local ideas and contracted notions of pedants.

Our drama is especially available to general views of aeronautical and meteorological science. We may study all the local atmospheric changes of the hour, which, in accordance with the changeful seasons, are perpetually taking place over the broad surface of earth's scenery. Summer weather in all its phases, pearly dews and showers, and bright hot sun-light and thunder-storms, are fluttering over the landscapes of one hemisphere at this same continuous instant, that, on the other side of the planet, frost and feeble sun-light are shivering over the stern scenery of winter, and dismal snow-storms are howling over frozen lakes, naked forests, and boisterous tracts of ocean.

Our subject presents to us the whole surface of the earth,

comprising at one view its most sunny and tranquil and exuberant landscapes, but fleckered over like a leopard with fleecy clouds, cumuli and streamers and thunder-clouds, with occasional and periodical condensations of the accumulated evaporations of ocean—the north-easters of the North American Atlantic, and the periodical rains which accompany the shifting trade-winds and monsoons of the tropics. If you turn your eye toward the African continent, you may notice at this moment the course of a Sirocco sweeping like a vast smoke-wreath across the Great Desert, curling the drifting sand around the bases of the pyramids, and the sculptured capitals of the crumbling temples, and whelming a large caravan camped upon the homeless waste. On the Indian Ocean (where you notice that dark spot,) a typhoon is raging; along the Antarctic several fierce snow-storms are rushing in the direction of the temperate zone; a splendid aurora borealis illumines Northern Europe—evening, gorgeous with rainbows and rainbow-tinted skies, flutters where night serene, or black with tempests, is closing over the longitudes of Asia and of Africa, while the morning star is dawning on the American parallels, from Cape Horn to Labrador.

Our view from the upper atmosphere will soon enable us to recognize, from above, the clouds of every variety of density, and indicative of all weathers. We must associate with the landscape these changes of aspect, and become familiar as well with all the more beautiful and tranquil scenes of sunshine and flowers upon earth's landscapes, as with the scenery and storms of winter, on the oceans, deserts, and mountains of the globe. Our aerial surveys will make us familiar with all the phenomena, and all the beauties of the higher atmosphere. When a storm rages in the vicinity of the Andes, the Alps, or the Himalaya, we will place ourselves in some torrent-cleft ravine, or poisoning

over the higher summits, look tranquilly on the scene below.

Storms, as well as various squalls and local showers, occur frequently during the year, at almost every spot of the planet, particularly in the variable latitudes. Thousands of thunder-showers are always present upon the earth's tropical landscapes and ocean scenes. The careful student of electricity and meteorological phenomena must embrace the whole instantaneous condition of the earth's atmosphere.

M. Arago, the French philosopher, says that, from some researches which he has made, he has reason to think that it never thunders in the open sea or in the islands, beyond seventy-five degrees of latitude north—and he thinks the same holds good on continents.

We believe it is well ascertained that thunder and lightning are more seldom experienced, the further we proceed to the north. In the tropics, thunder storms are sometimes very violent. In the tract of the Atlantic bordering a few degrees on each side of the equator, extending from Africa to Brazil, thunder storms are of incessant occurrence. But it is remarkable that the lightning of the tropics, though so abundant, is far less destructive of life, striking less frequently than that of the temperate parallels.

In generalizing the effects of the sun's light, and its inseparable accompaniments, heat and evaporation on the entire surface of the planet, it appears probable that the rains on all the latitudes would be found to be in general accordance with the altitude of the sun in the changing seasons.

The rains of our own latitude are unquestionably greatest in June—and it seems reasonable to make this fact the basis of the general inference, because, with the sun's highest altitude, there is certainly increased evaporation, and the summer exuberance of vegetation needs the active alternation of sunshine and showers.

The chemical affinity of the warmer atmospheres for water increases, as is well known, in a geometrical ratio. so that the clear sea breeze bears with it over the sun-bright verdure of the tropical parallels more actual water than is suspended in the densest fogs of the Arctic.

The earth's convex being presented to the sun's light during consecutive years, at nearly the same line of incidence, it seems to have been difficult to account for, or to trace to their causes, the very great varieties of temperature and humidity which occur at the same place in successive seasons. It is probable that the equipoise of the unstable atmosphere, prevailing or invading certain tracts of a given latitude, leaves other parts of the same latitude in a countervailing relation to it; for instance, it is to be presumed, that an unusually severe winter occurring in North America, resulting from a great prevalence of north winds, is not accompanied by a similarly cold, but rather by a winter of less than average severity, in the same latitudes of Europe and Asia. Very great extremes at any point result probably from the changeful invasions and conflict of the atmosphere from more northern or southern latitudes, producing irregularities in the average line, as the reciprocal local successes diversify the broad line of battle between opposing armies; thus the snows of winter, doubtless, often present a very irregular, various, and waving line, compared with the line of parallel latitudes.

A strong blast of north wind in one district, or at one meridian of longitude, produces perhaps a heavy fall of snow, and unusually cold weather far in the line of the more temperate parallels, and thus establishes for the wintry atmosphere a large local conquest of the neutral ground, or even of the enemy's lines; while heat, the equatorial emperor, contemplates from his impregnable central dominions the bold invader, and assures himself of an early repossession of the lost territory,—perhaps he has been

pushing his hot columns under cover of artillery far into the northern latitudes in a totally different direction, and has thus left the exposed point open to his vigilant and tireless antagonist. The apparent anomalies of the climate of our temperate zone are the results of this conflict. The climate of a particular latitude and point of latitude is to be considered, first, with reference to its comparative local indigenous heat generated by the angle of the sun's light upon it—and, secondly, with reference to the exotic heat, negative or positive, to which its position renders it exposed. A chain of mountains of great altitude protect their surrounding valleys from the ultra mountainous winds; thus the north and south sides of a mountain may widely differ in climate. Oceans, lakes, deserts, adjacent districts, exert immense influences upon local climate, which are to be very carefully considered. The gravitation of the planets of our system on the earth's atmosphere will doubtless be found by future observers to determine many of the observed variations and anomalies of the atmospheric phenomena, and perhaps to constitute prospective meteorological data prophetic of the comparative intensity of the returning seasons.

As wherever human observation extends itself, all the parts of nature are in wonderful correspondence to great and determinate results—

The universal Cause

Acts to one end, but acts by various laws.

Nothing is foreign—nothing stands alone;

The chain holds on and where it ends unknown.

POPE.

As the motions of the planets in their swift, certain, slow-returning revolutions appear to be predetermined, and as their transits and eclipses can be ascertained with the most precise accuracy for an indefinite period of the future, it

seems probable that the atmospheric changes of the hour are also in accordance with perfectly definite results of the celestial motions. That is, if we may use a nautical expression, it is not probable that the weather at any and every point of the earth, at a particular moment, is a result of a daily special arbitrament of the Supreme Providence, (communicated to a clerk of the weather,) but that it results from laws as certain and predeterminate as those of the planetary motions.

The climate of the earth is then a result of its relation to the sun's light, and is determined by the globe's motion in accordance with gravitation, the vibrations of the atmosphere, and the grand pauseless mechanism of the heavens.

Independent of all the regular irregularities which the constantly changing gravitation of the other planets of our system inevitably produces in our atmosphere, a slow but certain change of climate must demonstrably result from the earth's course in the procession of the equinox—this is equal to $23\frac{1}{2}$ degrees of latitude, and is further illustrated by the zone of tropical fossils, palms and culmiferæ, elephants and mastodons, which is found to encircle the middle latitudes and the ices of Siberia. The very clouds which, borne on the changeful winds, are reflecting light and shadow on the earth at this moment, are doubtless a result of the equipoise of the earth's atmosphere, adjusted like the eclipses, and the subsidence of the geological formations to the laws of gravity acting during interminable ages.

This slow progression of the equinoxes carries with it, round the zones of the earth, a change of climate equal to forty-seven degrees of latitude, and thus, as plants and animals of a given species are generally capable of vigorous existence only within certain relations to the sun's light, and really inhabit only narrow zones of earth's landscapes, as

the sun's light and climate alter, so must the prevailing vegetables and animals advance or recede, taking place of those which may be stunted or dispossessed by the altered temperatures; thus an immense and constant succession is taking place, so that the change of the earth's poles, we state as an imaginary illustration of the probable effect of subjecting the Caucasian races of the temperate zones to the arctic or tropical temperatures, is in fact, to a considerable extent, a variation of real occurrence once in a thousand ages, *i. e.* an equinoctial cycle.

The real miracle of nature surpasses the dreams of the mythologists. It may well be said "the undevout astronomer is mad." The miracle of reality transcends the elaborate and incredible fables of the Pagan nations. As we study the true and demonstrable grandeur of Creation and the Creator, we shall be content to dispense with many of those miracles of past ages, in which the veneration and prolific intellect of the ancient nations, during its long struggle toward the goal of reality, compensated itself for those clearer illuminations and dispensations of the Supreme Wisdom, which appear to be slowly dawning on the advancing vista of future generations.

CHAPTER VIII.

The Influence of Climate on Animal and Vegetable Life.

The subject of this chapter—the influence of climate upon animal life, upon the means of maintaining health and the causes and characteristics of disease in all climates—presents considerations of great utility, variety and interest.

Our method of illustration is designed to portray the entire range of climate as it exists at the same moment, from the extreme limit of human habitations thinly scattered upon shores where the currents of the tropical ocean make the deepest impression upon the vast inhospitable ices of the poles, to those latitudes where a thousand species of palm-trees are lifting themselves in the heavens,—and where man lives almost without labor upon the spontaneous fruits which nature offers him beneath the fervid heat of the vertical sun.

The effects of temperature on man throughout the whole range of his habitations are incessant and resistless. From the earliest to the latest moment of life they are continually modifying the physical condition and the intellectual action of every human being, whether in health or disease.

Dr. Edwards, one of the latest and most approved of medical writers, says, “There is scarcely any agent which exerts a more powerful influence on life than the temperature of the atmosphere; hence its relations are amongst those which it is the most important to know. There is, moreover, no agent which we have more in our power to modify and adapt to our necessities. When circumstances prevent our doing so, as when we are exposed to the open air—[he probably was writing by a good warm fire,]—we have other resources to supply the deficiency. *Hitherto our care in this respect has merely been guided by instinct, or by that kind of observation which every body can make.* But it requires a more intimate knowledge of our relation to the external temperature, properly to regulate the employment of means expedient to protect us from the injurious influence of heat and cold.”

Nothing is more common than for persons to be injuriously affected by changes of temperature, in other words, to take cold; and yet they seldom know how or where they have taken cold, or cold has taken them. Dr. Ed-

wards' chapter on this subject is worthy of a careful reading. It is chiefly devoted to the capacity of animals to sustain cold at different periods of life. It is not in our power to do more than to advert to one of his conclusions, which is, no doubt, just: "that the young of all animals suffer less and recover more perfectly from the effects of cold;" that young birds, kittens, human infants, &c., will survive a greater reduction of the actual temperature of their bodies than older animals. This may be a necessary adaptation of nature to the state of helplessness in which **young animals exist.**

It was probably, however, neither the youngest nor the older soldiers who survived the hardships of the retreat of the French army in 1812, but men in the greatest vigor of the prime of life. It would be an interesting question how far the mental foresight, the experienced endurance of the older veteran, may have compensated for the absence of the greater physical activity of youth. We may probably add to this the proposition that comparatively older animals suffer less from excess of heat. Elderly persons who visit warm climates are undoubtedly less liable to their peculiar diseases, than persons younger and in full health. It has been remarked that the recruits for the British army were far more effective when not chosen from among very **young men.**

Dr. Edwards says—"There is scarcely any agent which exerts a more powerful influence on life than the temperature of the atmosphere, hence its relations are amongst those which it is the most *important* to know. There is, moreover, no agent which we have more in our power to modify and adapt to our necessities." We, undoubtedly, within certain limits, have the power of adapting temperature to our necessities; but on the grand landscape of the planet we do not control temperature. It is the sun's light that controls this agent. Temperature *controls* us. In

spite of all our contrivances of shelter and of clothing, in spite of the arts of civilization, in spite of science, all the science we yet have on this subject, temperature controls us.

Great Britain, with her coal mines, has yet fuel enough for several centuries; and Pennsylvania, with her inexhaustible coal mines, can do much to modify the rigors of winter and to sustain a high civilization. But both these countries are among those most highly favored with a genial temperature; they are the very middle ground of average climate, where man is capable of his most fortunate development. If their coal was either at the equator or the poles, would it not remain unused forever?

As stated in a preceding chapter, the average temperature of the year at the Equator, 2777 miles south of Philadelphia, is equal to 88 degrees Fahrenheit, which is about the extreme heat of the hottest hours in the hottest days of midsummer, while at a similar distance north of us, which represents the more northern explorations, the average temperature of the year is Zero, which is about the extreme cold of the coldest hours in the coldest days of winter at Philadelphia.

The fathers of medical science, Hippocrates and Galen, among the ancients—Dr. Cullen and Dr. Hunter, of Britain—Dr. Rush, Dr. Wistar and Dr. Physick, of Philadelphia—and Dr. Liebig, of Geissen in Germany, the able writer on animal chemistry, have all been born and nurtured in the more fortunate intermediate climates.

Born and living in the temperate climates, these great men, although they have doubtless appreciated to a great extent the influence of climate, can scarcely be said to have extended their observations over the entire range of human existence. Their views were somewhat local, and their reflections on climate, therefore, and their reasonings

are less forcible and conclusive than if they had embraced a complete contrast of the extremes of temperature.

The doctrine first suggested by Dr. Cruikshank, has been long admitted, and to a great extent is true, though perhaps not to the letter, that the blood of all the warm-blooded animals is maintained at the same uniform temperature under all the changes of the seasons, and all contrasts of climate. That the blood of the polar bear at the north, of the elephant at the south, of the race horse on the course, and the swine lazily seeking his food, is of the same temperature with that of a man in health,—and scarcely any variation occurs except in disease.

Dr. Davy, in a paper read before the Royal Society of London in 1814, has reported the results of numerous experiments on the temperature of aged persons—on those in youthful health—on sedentary persons—and on persons at the moment of great exertion, perspiring freely, and with pulse accelerated to 132, or twice its usual velocity. Yet in all his experiments on persons in health, the variation of temperature was trifling—the similarity was surprising. In scarlet fever he found the temperature 106 to 108, which is about 8 or 10 degrees above the healthful standard.

The modes, however, by which nature preserved so remarkable and uniform a law, were not for a long time so obvious, and, until the researches of Dr. Liebig, had scarcely been satisfactorily explained.

Dr. Liebig, in his excellent work on animal chemistry, advances and sustains the idea that animal life and heat are the result of the combination of the food with oxygen, in the process of respiration.

In short, that animal heat is sustained by breathing, is a result not dissimilar to that of a furnace—both require air, both consume carbon, both produce the same chemical result, the combination of oxygen with carbon—that is, carbonic acid.

The truth is, that as the equable temperature of the blood is to be maintained, more carbon is indispensably necessary in winter than in summer,—the primary and indispensable effort of nature is to sustain in all animals the uniform temperature of the blood; more carbon in our food, that is, more fuel, is proportionately necessary in cold temperatures than in warmer—in Sweden, more than in Sicily,—and in the more temperate climate of Giessen, “a *full eighth* more in winter than in summer.” In our own climate, *three-fourths* greater in winter than in summer appear to be necessary.

Even where we consume equal weights of food in cold and in warm countries, Infinite Wisdom has so arranged that the articles of food in different climates are most unequal in the proportion of carbon they contain. The fruits on which the natives of the south prefer to feed, do not in the fresh state contain more than 12 per cent. of carbon, while the bacon and train oil used by the inhabitants of the arctic regions, contain from 60 to 80 per cent. of carbon.

The appetite for food, especially the more nutritious kind of food, is stronger in all animals in winter than in summer,—in cold climates than in warm—in cold climates it is even ravenous. Credible travellers inform us that the Samoides, the Esquimaux, and other natives of the North, will eat at a meal ten pounds of flesh, washed down with a quart or two of train oil—and that we should be inclined to do so were we exposed to the same degree of cold. In short, in cold climates the necessity of abundance of the most nutritious food is absolute—the activity of the digestive organs is proportionate, and the consumption of carbon in the process of respiration is also proportionate, and the result is the production of animal heat adequate to maintain the blood of the requisite temperature.

In the hot climates it seems to be essential to healthful existence to keep down activity and excitement; men

are inevitably indolent, and thus instinctively avoid an activity which would be inevitably fatal.

Among the modes in which Nature equalizes and sustains the equable temperature of the warm-blooded animals, under every variation of season and climate which the angle of sunlight dispenses upon the earth's surface, the consideration of none is perhaps more important to the physician than the perspiration, its causes and effects.

As animals of north latitudes, whose lungs and respiratory organization are more active and adapted to the production of great animal heat, perspire very freely in a temperature only a few degrees warmer than their accustomed average climate,—while animals of more southern latitudes, on temporary exposure or acclimation, would in the same temperature suffer severely from cold, so young and vigorous and active animals, whose circulation and heat-producing organization are energetic, require cooler temperatures than the aged, the sedentary or the enfeebled. Thus patients in various diseases of acute inflammation or chronic feebleness undoubtedly require different temperatures, and ought not (when it can be avoided,) to be grouped in the same apartments. It is by the means of perspiration, by the adaptation of the skin to its exposure, in different temperatures, that Nature endeavors to equalize the very considerable changes to which all animal life is exposed. Heat, from whatever cause produced, severe labor in a cold atmosphere, by an artificially warm temperature, as by voluntary immersion into a hot oven, or from the intense solar heat which a high angle of the sun's light necessarily causes, invariably produces in the healthy animal perspiration proportioned to its intensity. This perspiration and the coolness which it produces, greatly equalize the temperature under every exposure. Perspiration is a safety valve for the escape of superabundant heat. In warm climates, in warm rooms, and under great

labor, we drink large quantities of water to sustain this perspiration—juicy fruits and melons are in demand. On the contrary, when exposed to cold, whether it is that which the fur-clad Greenlander suffers at the rigorous extreme of his dreadful winters, or which the heat-oppressed native of the torrid zone experiences when he plunges into a tepid river at the Equator, at 75 or 80 degrees, the skin contracts—and thus by rapidly inverting the superficial circulation, increases the energy of the heart's reaction and consequent production of vital heat. It is thus that, under all circumstances, the effort to sustain the equable temperature is maintained—any considerable departure causing certain death.

The inhabitants of extreme climates are found to avail themselves of all the means which their intelligence can command to produce artificially a temperate atmosphere—the use of warm clothing, of furs, of tight houses, of animal food, of ample fires, mitigates the inhospitable winters of the North, and prevents *their* diseases.

Light clothing, parasols, latticed houses, the use of vegetable food and juicy fruits, fountains, frequent bathing, and the importation of ice, cool and render comparatively tolerable the torrid summers of the South.

Similar compensations exist in the economy of the inferior animals—the winter coat of the horse of the fortieth parallel, is rough and thick, analogous to that which protects the horse of Siberia and Canada, while his summer coat is thin and velvet like, as that of the horse exiled within the tropics.

The generalization of the laws of temperature on the entire range of animal life, will be found of essential interest to the patient and vigilant student of physiology.

As animals of the lowest orders are resuscitated and restored from their torpid winter existence to full vigor, as soon as the increasing angle of sunlight produces on their in-

digenous parallel the temperatures essential to their respective species,—as the imprisoned song-bird, silent during the cold of winter, resumes in spring his warblings and his loves,—as the cricket chirps when fire is kindled on the rustic hearth,—as every form of vegetable life depends essentially on its proper temperatures for its partial or complete development; so the existence and complete development of man and his functions, physical, mental and moral, are found to be scarcely less dependent on temperature, and that Nature, under unfavorable circumstances, concentrates all her efforts on the maintenance of his mere existence. Like the song-bird in the winter, proud man, when exposed to severe cold, becomes silent and sullen. Even when the temperature of a drawing room becomes a very few degrees too cold, his attention is more or less diverted from the exertion of his intellect, to the uneasiness of his mere physical existence—conversation languishes and the lecture becomes dull. On the contrary, when an excess of heat occurs, a similar effect is inevitable—the intellect languishes in an artificially torrid zone.

Since the greater facility of producing heat by our anthracite furnaces, a temperature ten degrees higher than those hitherto considered healthful, (Dr. Cullen, 62, Dr. Physick, 68,) has become fashionable. But this is injurious, persons should not be warmed to such an extent by artificial atmospheric heat; they should be more warmly clothed and breathe a cooler atmosphere. A radiating fire, or one that warms a room unequally, has this great advantage—that chilly or less healthful persons can by greater or less proximity to the source of heat be comfortable, and thus all may find in the same drawing room a temperature adapted to their respective conditions.

The clothing of men is in general, perhaps, more consistent with health, but while a lady's full dress unduly loads some portions of her person, but leaves the throat,

chest, and shoulders exposed, it is very difficult to know what ought to be the temperature of any apartment. Some persons no doubt dress too warmly, others too thinly, for their respective temperaments and exposures; it is undoubtedly difficult to adapt one's clothing, wisely, to the often sudden vicissitudes of the weather—many persons are foolhardy as long as they have health to trifle with—but that one portion of the same individual should be overclothed, and other portions, as the throat and the feet, exposed to cold, is much more destructive to health than any uniform dress which can be devised. If the ladies of the United States, who are in winter exposed to severer extremes of cold than those of Europe—the winters at Philadelphia averaging nine degrees colder than those of London, and six degrees colder than those of Paris, and are subject to greater changes—could by any means be induced to dress more rationally, they would confer incalculable benefits on themselves and on mankind.

Comparative physiology throughout every species of animal and vegetable life, as existing in the landscape of nature, demonstrates that the whole is comprised within a very limited range of temperature—say 100 degrees of the scale of Fahrenheit. It may perhaps be assumed that no vegetable can grow in a temperature which freezes water, and that therefore the freezing point is safe as the lowest limit. The determining the highest heat which vegetables sustain under the vertical sun of the ecliptic is not so easy, because the great evaporation to which their organization appears to be adapted, tends undeniably to diminish the heat they experience in the same manner that profuse perspiration cools and renders tolerable the severer labors of animal existence. As a high angle of the sun's light is necessary to the growth and proper maturity of those vegetables on which man is chiefly dependent for his daily food, the harvest labors of the husbandman in all latitudes

are generally performed in the warm season, hence the allotment, "in the sweat of thy brow shalt thou eat bread," is in fact a necessary adaptation of his nature to the changeful temperatures of his earthly dwelling-place.

The extreme limit of the temperature in which animal life can be maintained is in fact a narrow one ; for although man at one time closely wrapped in triple coats of fur, penetrates the Arctic circle, where he finds all the indigenous animals admirably provided with such dense coverings of fur or feathers as render them capable of existing in the most intense cold, and at another time clothed in the thinnest textures, and, bearing a shade to defend him from the tropical sun, explores with more boldness and at a great risk of life the torrid regions of the Equator ; these artificial precautions are indispensable, without them he could scarcely exist for an hour. According to the received doctrines of Drs. Cruikshank and Munster, we have already quoted, the blood of all the warm-blooded animals, whether in the temperate, at the Arctic, or the tropical parallels, maintains a very uniform temperature ; and this uniformity is sustained by a very skillful adjustment of their organization and instincts, to the necessities of their being. Some animals migrate, as the birds ; some hibernate deep in the earth or in hollow trees during the dreary season of winter, a few species are so constituted and so well protected with warm coverings as to be adapted to cold, and to remain cheerful and active in defiance of the winters of the north.

If certain narrow limits of temperature are actually necessary to the mere existence of animals and vegetables, a much narrower limit is necessary to the complete performance of their functions. Thus as any species of tree, the apple for instance, may exist through a wider range of latitude than the very limited one in which the climate is adapted to its perfect development and fruitfulness, and

such is undoubtedly the fact in nature, so a man, born and nurtured in the temperate zones, may colonize himself afar from the fields of his fathers, "in the climes of the sun," or towards the inhospitable Arctic, and, though he cannot there expect to develop adequately his intellectual powers, or to perpetuate the best characteristics of his race. he may by the help of great artificial exertion maintain life as a mere existence. In like manner, even for short periods, if the temperature of a study or a drawing room becomes only a few degrees colder or warmer the vivacity of colloquial interchange is diminished, and the sensation of physical discomfort soon forces itself on the attention of the most robust and stoical of our race.

Extreme climates and temperatures are obviously not those in which the more perfect developments of vegetable, animal or human life are found. Man himself, with all his industrious skill in artificially adapting himself to temperature, is capable of existing only within comparatively narrow limits of the scale of the thermometer.

But if extreme climates and temperatures are thus unadapted to vegetable and animal and human life, it is important to remark, that it is not an absolutely equable uniform temperature,—an eternal spring, which is to be desired, but that it is the climates of the variable latitudes, where there is the appropriate and agreeable contrasts of summer and winter in which human life, organization and faculties are most remarkable.

The sensations of warmth and coolness within moderate limits, and alternating within limited periods, are reciprocally stimuli or tonics to the nervous system, and, to healthful persons, are highly promotive of health. Thus it is better in all weather, even the severest cold, that all healthy persons should be in the open air for longer or shorter periods several times every day. Cold air in winter, and cold water in summer, judiciously used, are very im-

portant stimulants, but it is essential that they should be used moderately. The sensations of heat and cold continued for a considerable period, become debilitating and unhealthy. June, the first of the summer months, is the most healthful month of the year—but the continued heat becomes unhealthy, and July is perhaps the month of greatest mortality. It is remarked that the natives of tropical climates sustain cold the first winter of their sojourn in the temperate climates, much better than in succeeding winters.

The Baron Humboldt, in his researches among the mountains, elevated plains, and table lands of intertropical South America, estimated the colder temperatures consequent on elevation above the ocean level, to equal those of a degree of latitude further from the equator for every 328 feet of elevation—and that while the climate of some of these mountain situations presents an average mean annual temperature nearly that of the most fortunate countries of Europe and of the globe, yet that the difference between the coldest day of winter, and the warmest day of summer, was not more than ten degrees. That thus the climate was a perpetual spring. But he remarks, “the European race degenerates in this equable climate!”

It appears certain that an absolutely or nearly uniform temperature is not conducive to, or compatible with, vegetable, animal or human perfection.

As an eternal spring would not ripen the apple, the Indian corn, the peach, or the melon of the temperate parallels,—as an eternal summer, unrelieved by the rainy seasons, and mitigated heat of the tropical winter, would be fatal to the most sun-loving plants of the equator,—as an eternal winter, unvaried by the return of the Arctic summer, would lock in never-ending torpor the cryptogamia of the polar circle,—as the pine-apple, the cotton-plant, the Indian corn, the wheat, the birch tree, and the reindeer:

moss undoubtedly require for their growth, blossoming, and most perfect maturity, a variety of those delicately adapted temperatures of spring and early summer, the heats of noonday and the dews of night, such as we find occurring appropriately to each in their respective latitudes, in the great landscape of nature,—so man himself is a creature thriving most, neither in eternal spring, perpetual summer, nor everlasting winter; but appearing to require the varieties of the seasons, and existing most energetically in a somewhat narrow zone of the variable latitudes.

Moderate degrees of heat and cold continued for short periods, and alternating with each other, are more salubrious and invigorating to healthful persons than any one long-continued unvarying temperature. Being in the cold air for an hour of a winter's day, or in a cold bath for a few moments, may to a person in health be exciting and highly beneficial. But the same person at the end of a single week may be in less vigorous health, and the same exposure may be seriously injurious; or if too long continued would injure the most robust health.

There is, said the late Dr. Parrish, nothing more debilitating than cold. The effects of heat are perhaps not a whit less debilitating. It is remarkable that the sensible effects of heat and cold upon the skin, are so similar as scarcely to be distinguished.

It is certain that a comprehensive study of temperature, and its relations to health and disease, has not yet sufficiently attracted the attention of physiologists. The whole science of life is intimately connected with it.

As the diseases of the tropics may become acclimated for a few weeks of summer in the temperate zones, disappearing with the first frost, and those diseases which belong to cold climates sometimes occur during winter, and the prevalence of wintry temperature in the more temperate parallels, so not only the propagation of diseases but their

character when present, is respectively modified by temperature.

The theory of the coincidence of certain temperatures with the occurrence of certain diseases, applies equally well to the doctrine of the chemico-pathological agency of heat in the production of miasma, and in the susceptibility of the human system to its action—whether miasmata are considered to be of chemical origin from decaying vegetation, or to be marsh-nurtured animalcula infesting the air, or as Dr. Willis and Mr. Daniel, who are now investigating the diseases of Western Africa, believe, malaria and the unhealthfulness of the intertropical climates, results simply from the heat combined with moisture—in other words, from moist warm air,—as in either case heat is equally necessary to the presence of each of these pestiferous agents.

The yellow fever has never yet occurred in our latitude except in a season of unusual heat. It is stated that in every instance when it has occurred in Philadelphia, the mean temperature has been for three weeks previously not less than $79\frac{1}{2}$ degrees.

The endemic diseases of the equatorial parallels are found to extend themselves with the more vertical sunlight toward the tropics, and diseases analogous to the yellow fever of tropical latitudes (whether endemic or propagated by contagion,) are likely to appear whenever the intense heat of summer produces, for the time, tropical temperatures in the more temperate parallels. As we find the yellow fever in summer occurs at Havana on latitude 23 north *usually*, at New Orleans on the 30th *frequently*, at Charleston on the 33d *less frequently*, and sometimes, though very rarely, at Philadelphia and New York cities of the 40th parallel—but disappearing in all instances with the return of frost, so we find that the catarrhal and pulmonary diseases of cold parallels are apt to appear during the winter of more southern skies. These diseases occur when, in

fact, those temperatures are present which are productive of the peculiar diseases of the north, and thus the winter and summer of the temperate zones subject their inhabitants alternately, to some extent, as the temperature alternates, to the diseases of tropical and arctic latitudes.

If man could migrate like the birds it would be often essential to his health, and it is common to find invalids fleeing at the approach of winter to warmer climes, and to find the inhabitants of southern regions avoiding the ardent heats of summer by a sojourn at the north, or amid the breezes of the ocean; but it is easier for man to mitigate the rigors of a cold climate than to moderate the heats of the tropics.

A favorable change of wind may for the time, and in degree, ameliorate the climate and produce the relief which is sought for when the pulmonary invalid seeks a southern clime, or the heat-enfeebled and feverish patient betakes himself to the cooler air of the sea side or of the mountains.

The influences which climate, the fact of proximity or remoteness from the temperate latitudes, either toward the torrid or frozen regions of the earth, exert on the health and physiological condition of man, deserve, among innumerable other facts of every locality, a very careful arrangement.

According to Monsieur de Jonnés, of the Institute of Paris, the average annual mortality of the natives of the torrid zone may be stated at one in 25 or 27 individuals—while the average mortality of the most healthful countries of the temperate zones is only one in 58 or 59 persons; by which it appears that the chances of life in temperate climates are considerably more than twice greater than under the blazing sun of the tropics. This result is caused partly by the fact already stated, that it is easier to protect ourselves artificially from cold than heat.

The climates he found most favorable to the prolongation of human life, are those of the northern portion of the temperate zone of peninsular Europe, where the temperature is comparatively cold and even rigorous, generally, but still modified in winter by the Gulf Stream current of the Southern Atlantic.

The ocean breeze is healthful in all climates, but it is remarkable that the humid atmosphere of the ocean in northern latitudes should be the most congenial of all others to human longevity; accordingly, islands have remarkable healthfulness. The climate of the British isles, of cold and foggy and mountainous Scotland, and the maritime countries in the vicinity of the Polar circle—Sweden and Norway and Iceland—appear to insure the longest period to human existence.

In warm climates, the chylopoietic diseases, the bilious fevers which accompany the miasma of decaying vegetation—the whole class of maladies which affect the digestive organs, derive great activity, probably from causes analogous to those chemical laws by which increased temperatures hasten the universal tendency to putrefaction—while in cooler climates these diseases are comparatively unknown; and pulmonary diseases, those infirmities to which the delicate organization of the lungs is liable, increase as we approach the variable latitudes, and become the most destructive on the bills of mortality in the temperate zones.

The mortality of warm climates is always much greater to strangers than to acclimated and native residents—thus in Batavia the observed mortality of Europeans is one to eleven, while to natives it is not much above the average mortality of tropical countries.

The healthfulness of countries, of districts, of cities, is varied greatly of course by civilization, modes of life, and a thousand causes; but the great influence of temperature exhibits itself in every country, in every race, and under

every degree of civilization. The chances of death are one half greater on the smiling plains of Italy, or under the beautiful skies of Greece, than in uncivilized Russia, or amid the frozen fields of Iceland.

At a recent meeting of the British Statistical Society, a paper was read on the means of forming and maintaining troops in health, the author being Mr. Balfour, an Assistant Surgeon in the Madras army. A London journal, alluding to the matter, says:

“The inhabitants of towns are the individuals whose position most closely approximates with that in which troops are placed; and the mortality among the inhabitants of towns in the prime of life is nearly one-third greater than among the rural population. In comparing, therefore, the mortality of military life, it becomes necessary to take for the standard the average of those towns in which the troops are quartered. The deaths among the foot guards amount to 21.16 per thousand annually, and 16 per thousand may be fairly received as the average of the civil inhabitants of Britain. We thus obtain a standard by which to contrast the loss of life in Britain, with that to which our armies are subject when serving in foreign countries.” The following is the result of Mr. Balfour’s researches:—

This table, of course, relates to healthful men in the prime of life.

						An. mor. per 1000
New South Wales	-	-	-	-	-	14.1
Cape of Good Hope	-	-	-	-	-	15.5
Nova Scotia and New Brunswick				-	-	18
Malta,	-	-	-	-	-	18.7
Canada, Upper and Lower,				-	-	20
Gibraltar	-	-	-	-	-	22.1
Ionian Islands	-	-	-	-	-	28.3
Mauritius	-	-	-	-	-	30.5
Bermudas	-	-	-	-	-	32.8
St. Helena	-	-	-	-	-	35

Tennasserian Provinces	-	-	-	-	50
Madras Presidency	-	-	-	-	52
Bombay “	-	-	-	-	55
Ceylon	-	-	-	-	57.2
Bengal Presidency	-	-	-	-	63
Windward and Leeward command	-	-	-	-	45
Jamaica	-	-	-	-	143
Bahamas	-	-	-	-	200
Sierra Leone	-	-	-	-	483

According to the best authorities there annually dies in the Roman States of Italy, and in the marshes of the Campagna. Of the whole population, 1 in 28 persons

In Italy and Greece	-	-	-	1 in 30
In France and Prussia	-	-	-	1 in 39
In Spain, Portugal, Austria, and Switzerland	-	-	-	1 in 40
In Russia and Poland	-	-	-	1 in 44
In Germany, Denmark and Sweden	-	-	-	1 in 45
In Norway	-	-	-	1 in 48
In Iceland	-	-	-	1 in 53
In England	-	-	-	1 in 58
In Scotland	-	-	-	1 in 59

Mortality of Cities.

In New York city	-	-	-	1 in 37
In Boston	-	-	-	1 in 38
In Philadelphia	-	-	-	1 in 36
In Cincinnati	-	-	-	1 in 35
In Naples	-	-	-	1 in 28
In Paris	-	-	-	1 in 33
In London	-	-	-	1 in 39
In Glasgow	-	-	-	1 in 44

If the temperate zones of latitude are undeniably important to the health of their inhabitants—the comparative local healthfulness of local districts cannot be too carefully

studied. The respective advantages and disadvantages of the fertile marshy valleys of rivers, so often infested with endemic miasma, ought to be carefully compared with the pure air and bubbling fountains of less fertile mountainous situations. And the emigrant to the Campagnas of the new world should value, against pestilence and impaired health, the buoyant, energetic, prolonged existence of the mountaineer.

It is estimated that the improvements in civilization, and in the arts and arrangements of life, have within the past century, in some of the countries of Europe, increased at least one-third the average duration of human life.

Among the causes of diminished mortality consequent on progressive civilization, and man's observance of the natural laws, are :—the draining of marshes, the embankment of rivers and the location of dwellings in dry and healthful situations—the greater attention to cleanliness in clothing, and in the modes of cleaning towns by aqueducts and subterranean sewers—to the ventilation of dwellings and hospitals and public buildings—vaccination and sanitary arrangements, which prevent the importation or communication of contagious diseases—the improvements in machinery, the introduction of the steam engine, the cotton plant, the cotton gin, and the cotton spindle, which have promoted the more comfortable clothing of mankind—greater attention to children in their infancy, improved education and laws which limit the hours of their employment in factories, &c.—the better food which an intelligent and improved agriculture produces—the cultivation of justice and benevolence, and the predominance of the moral sentiments and intellect over the mere animal nature.

Among the causes which shorten human life in all climates, are unfavorable seasons and abrupt vicissitudes of temperature, marshy situations,—unsuitable clothing—the effects of labor too long unremitted, especially in child-

hood and youth—high prices of food and the necessities of life, in comparison with the wages of labor—pestilential diseases—the want of cleanliness, and neglect of ventilation and pure air in the dwellings of the poor and of the rich, in school houses, lodging-rooms, and in public assemblies—the excessive use of spirituous liquors—drunkenness, and luxury, and indolence—and war, but less in consequence of battles than of forced marches, unhealthful encampments, and the mal-commissariat of armies.

Human life is short under the most fortunate conditions. We all enter life helpless, and totally ignorant. It requires time and experience for very moderate acquisitions of knowledge. In those climates where life is most precarious, the inexperience of youth scarcely gives place to maturer reflection before the infirmities of age are already present—and inevitable dissolution closes the career of the individual before he can have contributed much to the improvement of the species.

On the contrary, in the most healthful climates, which are usually those where the human race is most distinguished for its aggregate good qualities, a much longer interval occurs between the ignorance of youth, and the fatuity of age.

Men who may have at forty years acquired some degree of valuable knowledge, may be expected to enjoy its power, and to enlighten their contemporaries, to carry forward science and legislation during very many years.

In a good climate, a man poor at forty, may die, as did Stephen Girard, possessed of immense wealth ; a drunkard at forty may reform, and live many subsequent years of vigorous existence, a good man and wise. The peculiar activity of the nervous temperament, and the reckless application which often shorten the lives of profound students and men of genius, are in healthful climates less destructive,

and such men may live, as did Sir Walter Scott, amid his native hills, to an old age of great intellectual vigor.

Health promotes knowledge, wealth, virtue—it secures to youth the counsels of hoary age, the inherited aggregation of fortune, the transmitted wisdom of actual experience—and if it is not virtue, it at least lengthens out to the sinner the chance of reform, of penitence, and of mercy. Moral truths, like intellectual, are not often acquired without experience—nor do virtues, like mushrooms, spring up over night.

A healthful climate, therefore, is a consideration of incalculable importance, and the careful study of the varieties of latitude and climate and the local natural history of the different countries, seems almost to determine the character of its people, and the intellectual and moral results which may fairly be expected from the inhabitants of any locality. Thus it is evident that the human race under neither extreme of temperature, neither in the arctic nor the torrid zones, has produced even an approximation to the master spirits of the Caucasian races; perhaps we might say with more propriety, to the master spirits of the temperate latitudes. A Homer or a Shakspeare in literature, a Newton in astronomy, a Columbus in nautical enterprise, a Cuvier in natural science, or a Napoleon in the field, could only have been nurtured in a fine climate. In the greater or lesser absence of the favorable and equable temperatures necessary to the best development of the human race, the inhabitants of any country will be found comparatively less intellectual, and less susceptible of those characteristics which ennoble mankind.

Accordingly, as we diverge from the temperate parallels, neither Siberia nor Siam, Arctic America nor sub-tropical Africa, have given names to history: their inhabitants are unavoidably inferior to the natives of more favored regions.

Further to illustrate the influences of climate, let us suppose for a moment that the temperate latitudes had never existed as at present, but that the temperate and torrid zones had traversed earth and ocean in totally different directions, as would have been the case if the axis of the Poles had passed through the present equator—so as to have originally thrown the Caucasian mountains and the British isles into the tropical or Arctic latitudes, and have blessed Congo and Hudson's Bay, Guyana and Kamschatka, with the most temperate climates,—what would have been the present existing condition of their respective inhabitants?—and what would now be the contrasts of condition and character consequent on such a change of climates, continued for a course of ages upon the present inhabitants of those widely differing portions of our planet?

Absolute equality of advantages as regards health and longevity, has obviously not been the intention of the all-wise Creator, any more than the absolute equality of original understanding, for which learned men have sometimes contended.

As hundreds of men have died prematurely of contagious diseases, or of the scarcely avoidable endemics of unhealthy latitudes, who might, under other circumstances of health and longevity, have displayed singular genius; as the accidents of life have destroyed in youth men who, had they lived, would have acquired distinction for their learning or wisdom, or have been beloved for extraordinary virtues; so the characters of whole nations, constituted of the aggregate character of their citizens, may be said to result in some degree from their local advantages of healthfulness, and their predominance among the empires, their superiority, or otherwise in arts, in arms, in science, in morals, in religion, may almost be said to be a birthright derived from the favorable influence of these on their organization.

As the character and influence among their cotempo-

varies of men of genius, bravery and science, depend upon their actual achievements, so the reputation and influence of nations is a practical result of the aggregate qualities, achievements, and capacities of its citizens. Had England been under the Equator, could she have been mistress of the ocean? If the negroes are a race not inferior to the Moguls and the Malays, why is it that they have not, like these, organized and maintained powerful empires? If the effects of climate are as great as the panorama of the earth seems to illustrate,—the importance of a very patient study of those arts of life, of clothing, of shelter, and of ventilation, by which man protects himself from the vicissitudes of the seasons, and thus artificially produces, even in unfavorable climates, some approach to those equable temperatures which promote health and longevity and all their concomitant blessings, commends itself alike to the physician, to the utilitarian, and to the philosopher.

The Effects of Temperature comprehensively considered.

Our purpose in the present chapter is to illustrate the control of temperatures, in their widest range over the processes of nature and of art.

To this design the following table will be useful, and is perhaps the best introduction that we have in our power at present to offer.

Professor Farraday, availing himself of the intense cold produced by the evaporation of the mixture of solid carbonic acid and ether, under the exhausted receiver of an air pump, and assisted by a pressure equal to 50 atmospheres, has produced the greatest degree of cold yet known to chemists,—166° of Fahrenheit below zero.

He subjected a number of gases to this low temperature, and the results were,

Olefiant gas was condensed into a colorless transparent liquid.

Hydrobromic acid was reduced first to a liquid and then to a solid state. As a solid it was clear and colorless, resembling ice.

Hydriodic acid afforded similar results.

Fluosilic acid was with difficulty condensed into a liquid state.

Sulphuretted hydrogen formed a chrystalline mass resembling camphor.

Liquid carbonic acid was frozen into solid mass, clear and transparent.

Protoxide of chlorine formed an orange-red crystalline mass, without explosive properties.

Protoxide of nitrogen was condensed by pressure and by the cold into a colorless crystalline solid. The liquid protoxide produces intense cold by its evaporation, which takes place at a very low temperature.

Deutoxide of nitrogen did not liquify.

Cyanogen was solidified.

146 Degree of cold below zero, produced by Dr. J. K. Mitchell, of Philadelphia—alcohol becomes syrupy.

103 Ammonia becomes a transparent solid of greater specific gravity than when liquid.—Farraday.

90 Greatest artificial cold produced by Mr. Walker of Liverpool.

78 Cold produced by mixing sulphuric acid and snow.

70 Natural temperature observed by Capt. Back, at Fort Reliance, north lat. $62^{\circ} 46'$, lon. 109° west.

65 4 parts alcohol, 1 water became viscid—2 parts, 1 water, froze into ice.

- 58 Estimated temperature of planetary space—Fourier.
 - 57 Pyroligneous acid freezes.
 - 55 Lowest degree registered by the thermometer of Capt. Sabine, during the winter of 1819, spent at Winter Harbor, Melville Island, north lat. 74° 47' lon. 110° 48' west. The mean temperature for six months, from November to April, inclusive, was $21\frac{3}{4}$ below zero.
 - 55 Strong nitric acid freezes.
 - 50 Natural temperature observed by Mr. Hutchins at Hudson's Bay.
 - 46 Ether and liquid ammonia freeze.
 - 45 Nitric acid freezes.—Cavendish.
 - 39 Mercury freezes. Melting point of quicksilver.
 - 36 Sulphuric acid freezes.—Thompson.
 - 17 Creosote fluid.
 - 11 2 parts alcohol, 1 part water, freeze.
 - 7 $\frac{1}{2}$ alcohol, $\frac{1}{2}$ water, i. e. brandy, freezes.
 - 3 Is the mean temperature of the coldest day ever known in the vicinity of Philadelphia.
- Zero is nearly the greatest extreme of cold known at Philadelphia. Equal portions of snow and salt produce zero.
- +7 1 part alcohol, 3 parts water, freezes.
 - 16 Spirit of turpentine freezes.
 - 20 The strongest kinds of wine freeze.
 - 23 Hydro-fluoric acid freezes.
 - 23 Coldest monthly mean temperature known for many years at Philadelphia.
 - 25 Human blood freezes.
 - 28 Vinegar freezes.
 - 30 Milk freezes.
 - 32 FREEZING POINT OF WATER. Ice melts.
 - 36 Olive oil freezes.
 - 40 Vegetable life awakens in the Spring, is suspended

- in the autumn. From 40 to 140 comprises the range of vegetable temperatures.
- 52 Mean annual temperature at Philadelphia. Monthly temperature of April and October, and of water in wells, at Philadelphia.
- 59 Vinous fermentation commences. All vegetable processes in art, brewers, bakers, all decomposition and reorganization in Nature commence.
- 62 Is the temperature which is most suitable for churning butter of the best quality.
- 62 The favorite or most proper temperature of apartments.—Dr. Cullen.
- 68 The most proper temperature of apartments.—Dr. Physick.
- 70 Best point of temperature for Brewers, and fermentation of bread.
- 76 Mean annual temperature at the Tropics.
- 77 Vinous fermentation is rapid. Vegetation and vegetable decomposition rapid. Acetous fermentation begins.
- 80 Greatest monthly mean temperature ever known at Philadelphia. This was July, in the hot and dry summer of 1838. It is stated that the yellow fever has never occurred at Philadelphia, unless after a continuous average heat of $79\frac{1}{2}^{\circ}$ for three weeks. This degree of heat is esteemed necessary to its production, and occurs only in seasons of great drought and heat.
- 88 Acetification ceases. According to other authorities it is said to continue seven degrees higher, up to 95.
- 88 Mean annual temperature at the Equator.
- 96 to 100 Animal temperature in all climates. Warm blooded animals coldest temperature 70, warmest, 112.

- 97 Lard melts.
- 98 Ether boils.
- 100 Phosphorus melts.
- 112 Fever heat. This temperature (of the body,) produces death in all the warm-blooded animals.
- 112 Spermaceti melts.
- 120 Heat of the Summer sun's light at Philadelphia.
- 120 Oxidation of lead. White lead works.
- 120 Bleaching temperatures commence, terminating at 212.
- 122 Phosphorus burns.
- 124 to 128 Greatest heat at which De La Roche and Berger existed for a very few minutes in watery vapor.
- 127 Tallow melts.
- 140 Liquid ammonia boils.
- 140 Greatest heat of the vertical sunlight on the Equator.
This temperature is the greatest natural atmospheric temperature which exists, and, when they are fully exposed to it, is sufficient to cause the death of all animals in a comparatively short time.
- 145 Camphor sublimes.
- 145 Ambergris melts.
- 165 Albumen coagulates—eggs are cooked.
- 170 Sulphur evaporates.
- 176 Alcohol boils.
- 201 Rose's Metal melts. 8 parts bismuth, 5 parts lead. 3 parts tin.
- 211 Newton's metal melts. 4 parts Bismuth, 2 parts lead, 3 parts tin.
- 210 Young man remained in a stove for twenty minutes.—Dobson's Experiments, Liverpool.
- 212 Water boils, and watery compounds boil. As a general rule the dissolving of any thing in water in-

creases the temperature required to produce boiling.

218 Water saturated with salt boils.

226 Sulphur melts.

230 Saturated solution of muriate of lime, (chloride of calcium,) boils.

230 Water saturated with sugar—syrup of sugar boils.

242 Nitric acid boils.

240 to 260 Dr. Blagden at Liverpool sustained this temperature eight minutes.

264 A baker's daughter is said to have remained in an oven, thus heated, for twelve minutes.—Tillet & Duhamel, 1760.

288 Camphor melts, and boils at 400.—Turner.

300 The surfaces of all furnaces, whether of iron, brick, or other material, designed for heating air for warming rooms, should never exceed this degree. Where they do, the purity and salubrity of the air is sensibly and seriously affected, a peculiar "baked" odor is imparted to it, as is so often the case in public assemblies, churches and private dwellings. To obviate this, furnaces or stoves should be of large size in proportion to the rooms to be warmed, a larger quantity of air should be admitted in proportion to the fuel consumed, which will of course be the means of a more equable and moderate heat, and better ventilation.

303 Sulphur burns slowly. Heat of baking ovens may be readily determined by the ignition of sulphur.

320 Volatile oils boil generally as high as 320, many of them 100 degrees higher.

X 300 to 350 comprise the temperatures proper for baking vegetable substances—bread, pies, meat, fruits, &c. The heat of a baking oven may, with a

little practice, be excellently well determined by the quick or slower ignition of a single sulphur match tied to a stick and held in the centre of the oven.

- 397 Creosote boils.
- 442 Tin melts, most easily of the metals.
- 460 The surface of polished steel acquires a pale straw color, and takes a slight degree of "temper" when suddenly chilled.
- 476 Bismuth melts.
- 554 Phosphorus boils.
- 560 Spirit of turpentine boils.
- 570 Sulphur boils.
- 580 The surface of polished steel acquires an uniform deep blue color, and when suddenly chilled, takes a high "temper."
- 590 Sulphuric acid boils.
- 600 Linseed oil boils.
- 612 Lead melts.
- 635 Iron begins to show light of ignition in the dark.
- 660 Mercury boils.
- 680 Zinc melts.
- 752 Iron bright red in the dark.
- 800 Hydrogen burns.
- 802 Charcoal burns.
- 809 Antimony melts.
- 884 Iron red hot in twilight.
- 980 Iron red heat—Daniel.
- 1077 Iron visibly red in daylight—Wedgwood.
- 1141 Heat of a common parlor fire—Daniel.
- 1207 Iron blood red in daylight—Wedgwood.
- 1857 Heat of an enamelling furnace.
- 2897 The diamond burns.
- 3807 Brass melts, $\frac{2}{3}$ copper, $\frac{1}{3}$ zinc.
- 4587 Copper melts.

4717 Silver melts.

5247 Gold melts.

For the higher furnace temperatures we can offer no measurement but those of Wedgwood's pyrometer, which is admitted to be far from a satisfactory one. A good pyrometer is a great desideratum in science.

8487 Working heat of plate glass.

10177 Flint glass furnace lowest heat.

11737 Carbonization of iron—steel manufacture.

12257 Liverpool ware baked.

12777 Lowest welding heat of iron.

13427 Greatest welding heat of iron.

13297 to 15637 Common sorts of China ware and porcelain vitrified.

15897 Flint glass furnace strongest heat.

17327 Greatest heat of a common smith's forge.

17977 Cobalt melts.

20577 Nickel melts.

Hessian crucible fused.

21637 Iron melts.

21877 Manganese melts.

Best Chinese porcelain softened.

Nankin porcelain not softened.

23177 Platinum, molybdena, tungsten, and the more refractory of the metals, melt.

Titanium most difficult to melt.

25127 Greatest heat observed.

The above table presents a scale of temperatures designed to show the control of temperature over the phenomena of nature and of art, in their widest range, from the solidification of the gases, the freezing of mercury and of water, to those delicate temperatures necessary to vegetable and animal life, existing on the landscape of Nature; and thence to those of the bleaching, boiling and baking temperatures,

and the furnace heats, from the melting of tin and lead, to those of the carbonization and welding heats of iron, and the melting of the metals most difficult of fusion.

Persons who have not given attention to the subject have no idea of the importance of certain precise temperatures to the best performance of many processes in the useful arts. A variation of five degrees will often not only render an operation ineffective, but partially or entirely destroy the materials employed. Certain temperatures are doubtless, in like manner, essential to all natural phenomena.

The table which follows is designed to show the effects of a comparatively small range of the natural atmospheric temperatures as they appear to affect the distribution on the earth's convex, of man the most sagacious of animals—and more especially the relation of climate to the existence of men of intellectual distinction.

The permanent ice may be estimated as existing unmelted by the arctic summers, on a circle of about 2000 miles in diameter, of which the North Pole is the centre. This desert of ice extends from the Pole on all sides, for about an average of 15 degrees, or to about the 75th degree of latitude. Explorers have seldom approached, and scarcely in any instance have penetrated, beyond the 74th, except at one portion of the arctic, the North Atlantic, where a southern current, alluded to in a former chapter, has enabled them in one or two instances to pass the 80th degree, and to give the northern outline of Spitzbergen.

For the first 15 degrees, or more than 1000 miles, the earth may be said to be not only uninhabited and uninhabitable, but an unexplored desert of ice; for the second 15 degrees, or another 1000 miles, man exists under such an unfavorable climate, that it appears to have produced no men of any remarkable intellect.

The following table will aid us in illustrating this part of our subject.

BIRTHPLACE.	North Lat.	MEN OF GENIUS.	Mean Annual Temperature.	Range, Winter, Summer.	AUTHORITY.
The North Pole, - - - - - Unexplored.	90°				
The most northern explorations extend beyond the 80th degree, only at one portion of the Arctic—the North Atlantic.	85	Impenetrable.			
Magdalena Bay, Spitzbergen, - - -	80 48'	Capt. Phipps' furthest,			Scoresby.
	80 10	Capt. Scoresby's furthest,			
	80	Uninhabitable.			
	79 34				
	78	The most northern human habitations.			
Cape Isabella, Baffin's Bay, - - -	77 48	Capt. Ross' furthest.			Capt. Sabine. Dr. Lawson. Capt. Parry.
Melville Island, - - - - -	75 34	Capt. Parry's furthest.	1½		
Winter Harbor, Melville Island, - -	74 47		32		
North Cape of Europe, - - - - -	71 10	- - - - -			
Volcano, Beerenberg, Spitzbergen, -	71 4				
Magnetic Pole, - - - - -	70 5				
	70	The most northern limit of the Birch-tree.			
Point Ogle, Arctic, North West America,	68 13				Capt. Back.
The Arctic Circle, - - - - -	66 32				
Tornea, Lapland, - - - - -	65 03				Dr. Lawson.
Uleo, Lapland, - - - - -	65 03	- - - - -	37 08		
Archangel, Russia, - - - - -	64 34	- - - - -			Capt. Back,
Drontheim, Norway, - - - - -	63 38	- - - - -	39		
Fort Reliance, North America, - -	62 46	- - - - -			Sir R. Phillips.
Yakoutsk, Siberia, - - - - -	60 02	- - - - -			
St. Petersburg, Russia, - - - - -	59 56	Gustavus Vasa,	38 34		
Stockholm, Sweden, - - - - -	59 20		42 26		

BIRTHPLACE.	North Lat.	MEN OF GENIUS.	Mean Annual Temperature.	Range, Winter, Summer.	AUTHORITY.
Stockholm, Sweden, - - -	59° 20'	Gustavus Adolphus, Charles 12th, Emanuel Swedenborg,	24 7		
Fort Churchill, Hudson's Bay,	59	Linnaeus,			
Rashult, Sweden, - - -	57 45	James McIntosh,	30 54		Sir R. Kirwan.
Inverness, Scotland, - - -	57 30				
Nain, Labrador, - - -	57	Murray, Earl of Mansfield,			
Perth, Scotland, - - -	56 22	Tycho Brahe,			
Helsingborg, Sweden, - - -	56 02	Dugald Stewart,	47 31	17 90	Dr. T. Lawson.
Edinburg, Scotland, - - -	55 58	Walter Scott,			
		John Napier,			
		David Hume,			
Greenock, Scotland, - - -	55 57	James Watt,			
Kilbride, Lanark, Scotland, - - -	55 46	Dr. John Hunter,			
Moscow, Russia, - - -	55 45	Peter the Great,	40 10	56 32	Sir R. Phillips.
Copenhagen, Denmark, - - -	55 41	Albert Thorwaldsen,	45 68		"
		Migrated at 23 to Florence.			
Ayr, Ayrshire, Scotland, - - -	55 27	Robert Burns,			
Thorn, Prussia, - - -	55 06	Nicholas Copernicus,			
Dantzic, Prussia, - - -	54 20	Fahrenheit,			
Elphin Roscommon, Ireland, - - -	54	Oliver Goldsmith,			
Castle Longford, Monaghan, Ireland, - - -	53 40	Wellington,			
Hamburg, - - -	53 32				
Dublin, Ireland, - - -	53	Edmund Burke,	49 10		"
Burnham, Norfolk, England, - - -	53 21	Horatio Nelson,			
Woodthorpe, Lincolnshire, England, - - -	53 04	Isaac Newton,			
Lichfield, England, - - -	52 54	Samuel Johnson,			
Alcmaer, Holland, - - -	52 41	Jacques Metius,			
Berlin, Prussia, - - -	52 38				
	52 32	Frederick the Great,	49		Dr. Lawson.

BIRTHPLACE.	North Lat.	MEN OF GENIUS.	Mean Annual Temperature.	Range. Winter. Summer.	AUTHORITY.
Oundle, Northamptonshire, England, -	52° 30'	John Dryden,			
Amsterdam, Holland, -	52 25	William Herschell,	51 62		Sir R. Phillips.
Hanover, -	52 22	Oliver Cromwell,			
Huntingdon, England, -	52 20	Sobieski,			
Warsaw, Poland, -	52 14	Kosciusko,			
Stratford, upon Avon, England, -	52 12	William Shakspeare,			
Irkutsk, Altai Mountains, Siberia, -	52 15		20		Sir R. Kirwan.
Berkely, Gloucestershire, England, -	51 46	Edward Jenner,	52 25		"
Leyden, Holland, -	52 10	Herman Boerhaave,			
Hague, Holland, -	52 4	Christian Huygens,			
Hereford, England, -	52 3	David Garrick,			
Rotterdam, Holland, -	51 55	Desiderius Erasmus,			
Eisleben, Saxony -	51 53	Martin Luther,			
Wantage, Berks, England, -	51 40	Alfred the Great,			
Halle, Saxony, -	51 36	George Frederick Handel,			
London, England, -	51 31	John Hampden,	50 39 23 20		Dr. T. Lawson.
		John Milton,			
		Francis Bacon,			
		Alexander Pope,			
		Edward Gibbon,			
		William Penn,			
		John Howard,			
		William Hogarth,			
		George Gordon, Lord Byron,			
Wrighton, Somerset, England, -	51 20	John Locke,			
Upper Lusatia, Germany, -	51 10	Abraham Gottlieb Werner.			
Kolstone, Kent, England, -	51 5	William Harvey,			
Penzance Lands End, of England, -	50 7	Sir Humphrey Davy,	52 16 15 84		"
Mentiz, Duchy of Hesse, Germany, -	49 59	John Gutenberg,			

BIRTHPLACE.	North Lat.	MEN OF GENIUS.	Mean Annual Temperature.	Range. Winter. Summer.	AUTHORITY.
Castle of Engelheime, Grnany, -	49° 55'	Charlemagne,			
Longvick, Vale of the Moselle, Germany,	49 40	John Gaspar Spurzheim,			
Noyon, France, -	49 40	John Calvin,			
Beaumont, near Houlleur, France,	49 30	Pierre Simon La Place,	51		Dr. T. Lawson.
Rouen, France, -	49 26				
Tiellinbrun, Germany, -	48 52	Dr. Gall,			
Paris, France, -	48 52	Voltaire,	51 50		
Wiel, Wurtemberg, -	48 50	John Kepler,			
Strasburg, France, -	48 46	John Frederick Oberlin,			
Vienna, Austria, -	48 34		50 14		Sir R. Phillips.
Salzburg, Germany, -	48 12	Johann Mozart,			
Montbéliard, France, -	47 37	George Cuvier,			
Nantes, France, -	47 13		55 53		"
Berne, Switzerland, -	47 13	Albert Haller,			"
Quebec, Canada, -	46 56		42 8		
Fort Brady, Wisconsin Territory, -	46 50		41 84		Dr. Lawson.
Marbach, Wurtemberg, -	46 39	Frederick Schiller,			
Geneva, Switzerland, -	46 34	Jean Jacques Rousseau,	49 28		Sir R. Phillips.
Bourg en Presse, France, -	46 12	La Lande,			
Thonette, France, -	46 12	Xavier Bichat,			
Clement, Auvergne, France, -	46 17	Pascal,			
Fort Vancouver, Oregon Territory, -	45 37		51 75		Dr. T. Lawson.
Milan, Italy, -	45 28		55 76		Sir R. Phillips.
Venice, Italy, -	45 25	Titian,			
Chavagnac, Auvergne, France, -	45 25	La Fayette,			
Perigord, Dordogne, France, -	45 11	Fenelon,			
Fort Snelling, Falls of St. Anthony, -	44 53		45 77		Dr. T. Lawson.
Bordeaux, France, -	44 50		57 60		"
Corregio, Italy, -	44 45	Corregio,			
Brede, France, -	44 40	Montesquieu,			

BIRTHPLACE.			North Lat.	MEN OF GENIUS.		Mean Annual Temperature.	Range, Winter, Summer.	AUTHORITY.
Genoa,	-	-	44° 25'	Columbus,				
Faenza, Italy,	-	-	44 17	Toricelli,				
Florence, Italy,	-	-	43 46	Galileo,				
				Dante,				
Perinaldo, Italy,	-	-	43 43	Americus Vesputius,				
Portland, Maine,	-	-	43 38	Raphael,		46 96		Dr. T. Lawson.
Arezzo, Italy,	-	-	43 38	Michael Angelo,				
Salisbury, New Hampshire,	-	-	43 24	Daniel Webster,				
Marseilles, France,	-	-	43 19			61 80		
Niagara, New York,	-	-	43 15			51 69		"
Pasignano, Italy,	-	-	43 12	Canova,				
Boston, Massachusetts,	-	-	42 22	Benjamin Franklin,		47 03		Sir R. Phillips.
				Migrated at 17 to Philadelphia.				
Northampton, Massachusetts,	-	-	42 20	William Cullen Bryant,				
Salem, Massachusetts,	-	-	42 20	Nathaniel Bowditch,				
Quincy, Massachusetts,	-	-	42 14	John Quincy Adams,				
Rome, Italy,	-	-	41 54	Regulus, Julius Cæsar,		60 70		Dr. T. Lawson.
				Cicero, Augustus Cæsar,				
				Seneca, Lucretius,				
				Virgil, Tacitus,				
				Horace, Caius Cestus,				
Ajaccio, Corsica,	-	-	41 46	Napoleon,				
Macedon,	-	-		Alexander the Great,				
Western Asia, Tartary,	-	-		Tamerlane,				
Eastern Asia, Tartary,	-	-		Genghis Khan,				
Newport, Rhode Island,	-	-	41 30	William E. Channing,		50 10 34 72		"
Fort Armstrong, Illinois,	-	-	41 28			51 57 49 20		"
Orange County, New York,	-	-	41 25					
Naples, Italy,	-	-	40 50	De Witt Clinton,		61 40		"

BIRTHPLACE.	North Lat.	MEN OF GENIUS.	Mean Annual Temperature.	Range, Winter, Summer.	AUTHORITY.
New York, - - - - -	40° 42'	Washington Irving,	53 78		Dr. T. Lawson.
Madrid, - - - - -	40 25	Ferdinand and Isabella,			
Trenton, New Jersey, -	40 13	J. Fenimore Cooper,	50 69		Dr. Ewing.
Burlington, New Jersey, -	40 5	Robert Fulton,			
Lancaster, Pennsylvania, -	40 03	The Caucasian race,			College of Physicians.
Mount Ararat, - - - - -	40	Thomas Godfrey	52 03		
Caucasian Mountains, - -	39 56	David Rittenhouse,			
Philadelphia, Pennsylvania.		Benjamin Rush,	55 68		Dr. T. Lawson.
Pekin, China, - - - - -	39 54	Benjamin West,			
Delaware County, Pennsylvania,	39 50	Charles Carroll,			
Baltimore, Maryland, - -	39 21	Galen,			
Pergamus, Asia, - - - - -	39 11	Hiram Powers,			
Cincinnati, Ohio, - - - -	39 6	John Marshall,	55 68 54 80		Dr. Lawson.
Washington City, - - - -	38 53	Homer, Achilles,	57 77		"
Fauquier County, Virginia,	38 45	Socrates, Lycurgus,			
Fort Jefferson, Missouri, -	38 28	Plato, Leonidas,			
Athens and Greece, - - -	38 35	Aristotle, Epaninondas,			
		Aristides, Miltiades,			
		Solon, Xenophon,			
		Zeno, Herodotus,			
		Diogenes, Euripides,			
		Phidias, Aeschylus,			
		Pericles, Sophocles,			
		Demosithenes,			
Westmoreland County, Virginia, -	38	George Washington,			

BIRTHPLACE.	North Lat.	MEN OF GENIUS.	Mean Annual Temperature.	Range, Winter, Summer.	AUTHORITY.
Monticello, Albemarle, Virginia,	38°	Thomas Jefferson,			
Sines, Portugal,	37 57	Vasco De Gama,			
Hanover County, Virginia,	37 47	Henry Clay,			
Samos, Isle of	37 44	Pythagoras,			
Miletus, -	37 20	Thales,	61 57		Dr. T. Lawson.
Norfolk, Virginia,	37 02	Hannibal,			
Carthage, Africa,	36 47	Hippocrates,			
Cos, an isle of the Ægean,	36 46				
Algiers, Africa,	36 42		69 98		Sir R. Phillips.
Keo-fow-hien Shantung, China,	36 30	Confucius,			
Nineveh, Assyria,	36 20	Ninus,			
Mesopotamia,	35	Abraham,			
Waxhaw, South Carolina,	34 50	Andrew Jackson,			
Ecbatana, Media,	34 50				
Abbeville, South Carolina,	34 30	John C. Calhoun,	65 24		Dr. T. Lawson.
Augusta, Georgia,	33 28				
Palmyra, Asia Minor,	33 20	Zenobia,			
Bagdat, Persia,	33 20	Haroun Al Raschid,			
		Abdallah,	58 5		
Charleston, S. C. -	32 44	Washington Allston,	64 56		Dr. Lawson.
Funchall, Madeira,	32 17				
Babylon,	32 30				
Jerusalem, Judea,	31 46	David, Solomon, &c.	66 16		H. Tooley.
Natchez, Mississippi,	31 34				
Alexandria, Egypt,	31 16	Euclid,			
Cairo, Egypt,	30 02		72 12		
New Orleans, Louisiana,	29 57	Rameses III.	71 40	26 58	Dr. Lawson.
Memphis, Egypt,	29 56				
St. Augustine, Florida,	29 50		72 24		"
Tampa Bay, -	27 57		73 19		"

BIRTHPLACE.	North Lat.	MEN OF GENIUS.	Mean Annual Temperature.	Range, Winter, Summer.	AUTHORITY.
Borduan, Bengal,	24° 18'	Rahmohun Roy,	77	9	
The Tropic of Cancer,	23 28		75	5	
Havana, Cuba,	23 12		78	3	
Canton, China,	23 7		77	72	Sir R. Phillips.
Calcutta, Hindostan,	22 34		88		Sir R. Kirwan.
[Rio Janeiro, Brazil, South Latitude,]	22 36				
Mecca, Arabia,	21 18	Mahomet,			
Vera Cruz, South America,	19 11				
Ponticherry, Bengal,	12				
sandy position.					
Caraccas, South America,	10 31	Simon Bolivar,			
3000 feet above the ocean.		Educated in Paris.			
Cumana, South America,	6 27		81	86	Sir R. Phillips.
Surinam, "	5	La Valliant,			
		Educated in Holland.			
Temperature at the level of the sea,		At the Equator,	88		Dr. T. Lawson.

In the above table pains has been taken to insert all the men who have been distinguished in the more Northern or Southern parallels; while in the central latitudes very many men of genius have been omitted.

As shown by the table of general temperatures, pages 200 to 203, the extremes of natural atmospheric temperature to which man is exposed in the extreme climates—from 70 below zero, the greatest cold observed by the arctic explorers, to 140, the heat of the vertical sunlight at the Equator—is about 210 degrees. But of these it is only a very small range in which man can be said to exist comfortably, or in which his mental faculties can be fully exerted. Perhaps 20 degrees, say from 55

to 75, or from 60 to 80, may comprise those which we may call the intellectual temperatures.

The intellectual table, pages 208 to 215, requires a careful examination. It shows that the first 1000 miles from the pole down to the latitude 75, is an unexplored desert of ice. The second 1000 miles does indeed produce a few human beings, but no men of intellectual distinction. Neither does it produce any of the more valuable plants. Thus north of the 60th degree, or for one third of the latitudes, no men of remarkable intellect have existed.

In like manner another third of the latitudes—the 30 degrees nearest to the Equator, from a totally different cause, excessive and enervating heat—appear to have produced very few men of any intellectual distinction.

Comprised within the intermediate 30 degrees of the temperate parallels, it will be observed, on careful examination, that it is a somewhat narrow range of intermediate mean temperatures—curving with those local modifying causes which alter the parallels of equal temperature—which has produced those men whose genius has imperishably impressed itself upon all human institutions.

Perhaps a line of mean temperature, indicated by the nearly coincident mean temperatures of Philadelphia, New York, Paris and London, might be stated as the centre of the intellectual zone. Boston and Edinburg would then indicate a parallel five degrees colder,—Quebec and Stockholm a parallel ten degrees colder. In temperatures colder than these, toward the icebergs, intellectual men are exceedingly rare.

A line of mean temperatures five degrees warmer than those of the central line suggested, will comprise the temperatures of central Virginia and of southern France. A zone ten degrees warmer will comprise *in its cooler portions* Charleston, South Carolina, and the warmest localities of Southern Europe. Southward of these, toward the

tropic, intellectual men are rarely found, and within 15 degrees of the equator they may be said not to exist.

In view of the vastness of the subject, this volume may be considered short. The author intended to treat more at length on the distribution of plants and animals—on the migrations of birds—on the coincidence of certain diseases with certain temperatures—on the influence of climate upon morals and human institutions, and generally upon those numerous facts which illustrate human existence.

He also intended to give his peculiar method of illustrating the astronomical laws. But the volume may be large enough to give an idea of his method of thought. Should a subsequent edition be called for, in all probability the work will be not only revised but enlarged.

THE END.

ERRATA.

Page 27, line 12, for *minute* read *second*.

" 70, " 9, for *Hoogly* read *Tigris*.

Hoogly is the river at Calcutta.

" 146, " 18, for *Largasso* read *Sargasso*.

AC8

F48

Fisher, Thomas.

Dial of the seasons.

